DATALOGIC™

MATRIX-1000™

Reference Manual

Datalogic Automation S.r.l.
Via S. Vitalino 13
40012 - Lippo di Calderara di Reno
Bologna - Italy

Matrix-1000™ Reference Manual

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24/05/07

CONTENTS

REFERENCES

CONVENTIONS

This manual uses the following conventions:

"User" refers to anyone using a Matrix-1000™ reader.
"Reader" refers to the Matrix-1000™ reader.
"You" refers to the System Administrator or Technical Support person using this manual to install, configure, operate, maintain or troubleshoot a Matrix-1000™ reader.

REFERENCE DOCUMENTATION

For further details refer to: the VisiSet™ Help On Line, Matrix Reading Methods, Matrix Host Mode Programming, Matrix SW Parameter Guide, provided as supplementary documentation on CD-ROM.

SERVICE AND SUPPORT

Datalogic provides several services as well as technical support through its website. Log on to **www.automation.datalogic.com** and click on the links indicated for further information including:

- **PRODUCTS**

  Search through the links to arrive at your product page where you can download specific **Manuals** and **Software & Utilities**

  - **VisiSet™** a utility program, which allows device configuration using a PC. It provides RS232 and Ethernet interface configuration.

- **SERVICES & SUPPORT**

  - **Datalogic Services -** Warranty Extensions and Maintenance Agreements
  - **Authorised Repair Centres**

- **CONTACT US**

  E-mail form and listing of Datalogic Subsidiaries

PATENTS

This product is covered by one or more of the following patents:

U.S. patent: 6,512,218 B1; 6,616,039 B1
European patent: 999,514 B1; 1,014,292 B1.

COMPLIANCE

For installation, use and maintenance it is not necessary to open the reader.

EMC COMPLIANCE

In order to meet the EMC requirements:

- connect reader chassis to the plant earth ground by means of a flat copper braid shorter than 100 mm;
- connect the main interface cable shield to pin 1 of the reader 25-pin connector;
- use two clip-on ferrite sleeves (type Stewart 28A2029-0A0) on the main interface cable near the reader 25-pin connector;

POWER SUPPLY

ATTENTION: READ THIS INFORMATION BEFORE INSTALLING THE PRODUCT

This product is intended to be installed by Qualified Personnel only.

This product is intended to be connected to a UL Listed Computer which supplies power directly to the reader or a UL Listed Direct Plug-in Power Unit marked LPS or “Class 2”, rated 10 to 30 V, minimum 1 A.

LED CLASS

Class 1 LED Product to EN60825-1:2001

CE COMPLIANCE

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

WEEE COMPLIANCE

GENERAL VIEW

Matrix-1000™

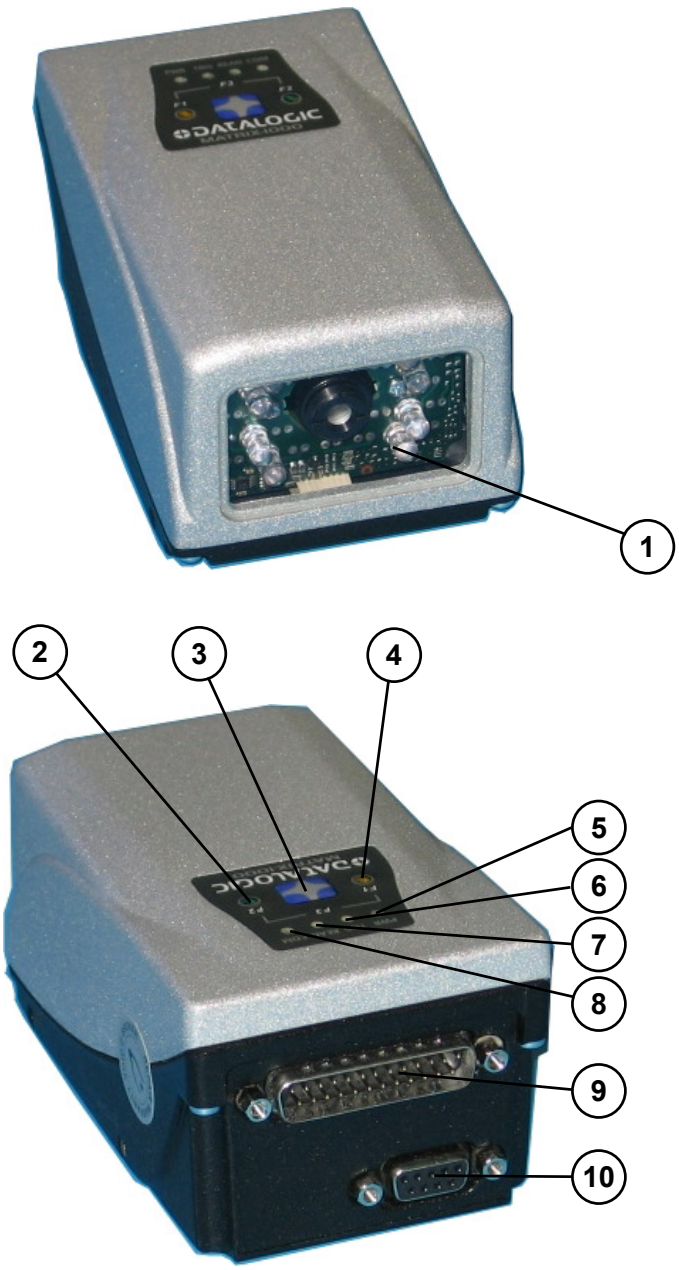


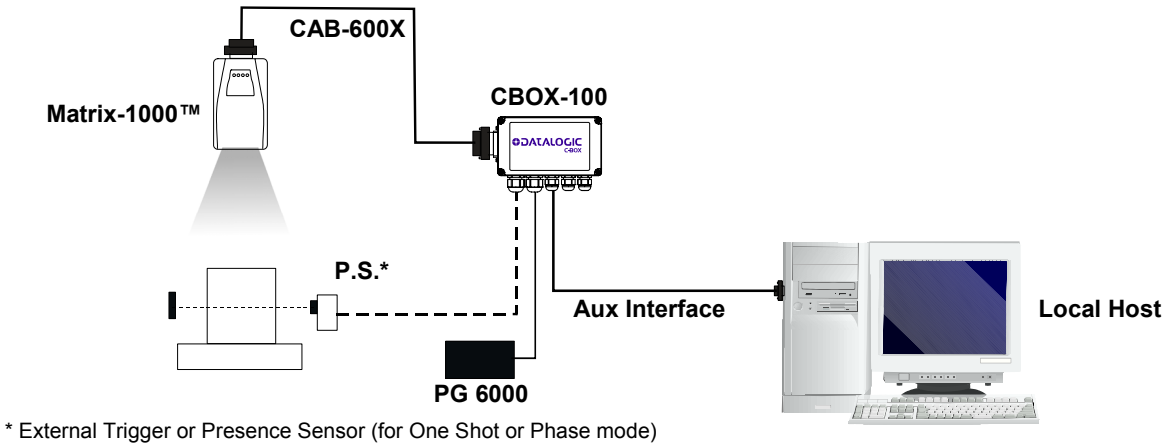
Figure A

① Reading Window
② F2 LED
③ Keypad button
④ F1 LED
⑤ Power On LED
⑥ External Trigger LED
⑦ Good Read LED
⑧ Communication LED
⑨ Main/Auxiliary Interface
⑩ Auxiliary Interface

1 RAPID CONFIGURATION

STEP 1 – CONNECTING THE SYSTEM

To connect the system in a Stand Alone configuration, you need the hardware indicated in Figure 1. In this layout the data is transmitted to the Host on the RS232 auxiliary serial interface which is also used for reader configuration by running VisiSet™.
When One Shot or Phase Mode Operating mode is used, the reader is activated by an External Trigger (photoelectric sensor) when the object enters its reading zone.



* External Trigger or Presence Sensor (for One Shot or Phase mode)

Figure 1 – Matrix-1000™ in Stand Alone Layout

C-BOX 100 Pinout for Matrix-1000™

The table below gives the pinout of the C-BOX 100 terminal block connectors. Use this pinout when the Matrix-1000™ reader is connected by means of the C-BOX 100:

C-BOX 100 Terminal Block Connectors			
Power		**Outputs**	
1, 3, 5	VS	21, 22	NC
2, 4, 6	GND	23, 24	NC
7, 8	EARTH GROUND	25	OUT 3+
20, 40	Reserved	26	OUT 3-
Inputs		**Auxiliary Interface RS232**	
27	EXT TRIG A (polarity insensitive)	35	TX AUX
28	EXT TRIG B (polarity insensitive)	37	RX AUX
29, 30	NC	38,39	GND
31, 33	NC	**Main Interface RS485 Half Duplex**	
32, 34	NC	11, 15	RTX 485+
36	NC	12, 16	RTX 485-
		17	NC
		18	NC
		10, 14, 19	SGND
		9, 13	RS485 Cable Shield

CAUTION

Do not connect GND and SGND to different (external) ground references. GND and SGND are internally connected through filtering circuitry which can be permanently damaged if subjected to voltage drops over 0.8 Vdc.

CAUTION

When connected to a C-BOX 3x0/4x0, Matrix-1000™ can only communicate through its Auxiliary Interface. The Matrix-1000™ 9-pin Auxiliary port connector cannot be used for communication (i.e. configuration through VisiSet™). To configure Matrix-1000™ through the 9-pin connector inside the C-BOX 3x0/4x0, the C-BOX 3x0/4x0 must first be configured. See the relative C-BOX Installation Manual for details.

STEP 2 – MOUNTING AND POSITIONING THE SYSTEM

1. To mount the Matrix-1000™, use the mounting bracket to obtain the most suitable position for the reader as shown in the figures below.

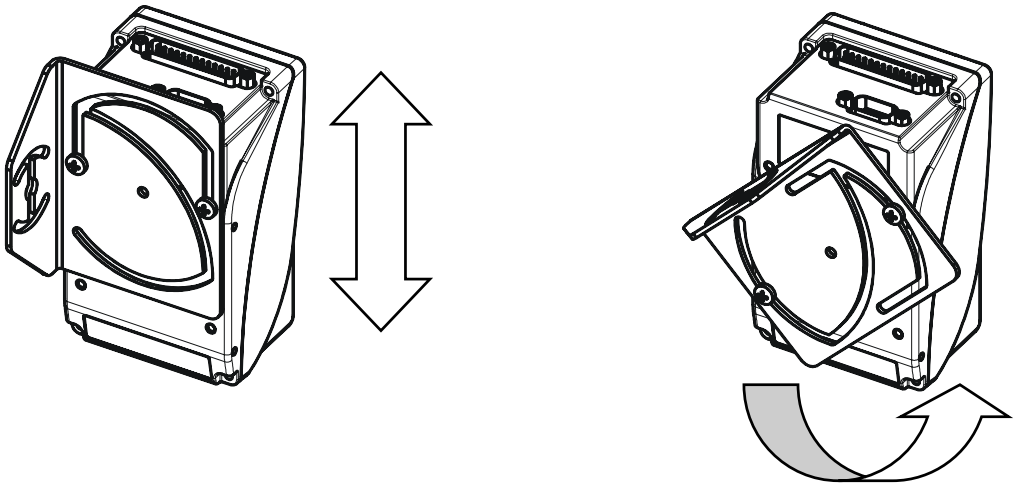
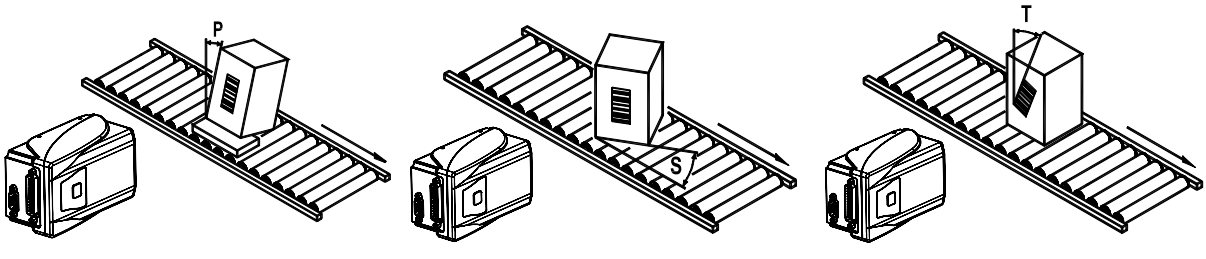


Figure 2 - Positioning with Mounting Bracket

2. When mounting the Matrix-1000™ take into consideration these three ideal label position angles: **Pitch or Skew 10° to 20°** and **Tilt 0°**, although the reader can read a code at any Tilt angle.



Minimize **Assure at least 10°** **Minimize**

Figure 3 – Pitch, Skew and Tilt Angles

3. Refer to the Reading Features in chp. 7 to determine the distance your reader should be positioned at.

STEP 3 – AUTOLEARNING CONFIGURATION

An autolearning procedure is available to reduce installation time.

Status and diagnostic information are clearly presented by means of four colored LEDs, whereas the single push button and F1 and F2 LEDs give immediate access to the following relevant functions:

- *Positioning (F1)* gives visual feedback from the F1 LED to help center the code in the reader's FOV without external tools or software programs
- *Auto Learn (F2)* to self-detect and auto-configure calibration and code setting parameters
- *Restore Default (F3)* to return to factory default settings

The colors and meaning of the four status LEDs are illustrated in the following table:

PWR (red)	This LED indicates the device is powered
TRIG (yellow)	This LED indicates the external trigger activity
READ (red)	This LED confirms successful reading. It is also used to signal successful startup. At power on this LED turns on and after a few seconds turns off. If the startup is not successful, this LED remains on.
COM (green)	This LED indicates active communication on the main serial port.

Auto Learn

If you are configuring your reader using the *Auto Learn* procedure:

1. Place the desired code in front of the reader at the correct reading distance (depending on the model, see the Reading Features table in chp 7).
2. Enter the *Auto Learn* function *(F2)* by pressing and holding the push button until only the F2 LED is on.
3. Release the button to enter the *Auto Learn* function.
   Once entered, the reader acquires an image and automatically configures the optimal Exposure Time and Gain parameters for static reading, as well as detecting and recognizing the code, which is presented to it. The F2 LED blinks during this process.
4. At the end of the procedure, the new configuration parameters will be stored to permanent memory, the F2 LED remains on continuously and then the function automatically exits, the F2 LED turns off.

If the Auto Learn calibration cannot be reached within a short timeout (max. 1 minute), Matrix-1000™ will exit without saving the configuration parameters, the F2 LED will not remain on continuously but it will just stop blinking.

To cancel the Auto Learn function without saving the configuration parameters, press and hold the keypad button at any time during the procedure: the F2 LED will stop blinking.

Auto Learn (F2) green

Figure 4 – Auto Learn Function

Repeat the procedure if needed, to program different code symbologies, however you must present only one code at a time to the reader.

Matrix-1000™ is able to decode any code symbology in its library with this procedure.

NOTE

If your application has been configured using Auto Learn, your reader is ready. If necessary you can use VisiSet™ for advanced reader configuration.

NOTE

Autolearning configuration parameters can be saved to temporary memory only by selecting the "Autolearning Setup>Store Memory" parameter in VisiSet™.

The Autolearning function on the keypad button can also be disabled by the user via VisiSet™.

Positioning (Optional)

At the end of the *Auto Learn* procedure, you can use the *Positioning* procedure to center the code with respect to the reader's FOV.

1. While the desired code is in front of the reader at the correct reading distance, enter the *Positioning* function *(F1)* by pressing and holding the push button until only the F1 LED is on.
2. Release the button to enter the Positioning function.
   Once entered, the reader continuously acquires images and gives visual feedback using the F1 LED to indicate when the code is centered with respect to the reader's FOV. Slow blinking means that the positioning value must be improved.
3. To obtain the best value in terms of positioning, move the code and/or the reader so as to position the code as close as possible to the center of the Field of View, keeping the correct focus distance. Check F1 LED blinking: the best code positioning corresponds to fast (almost continuous) blinking.
4. After a short timeout the function automatically exits, the F1 LED remains on continuously and then stops blinking.

If no valid code is present in the FOV, after about 3 minutes, Matrix-1000™ will automatically exit, the F1 LED will not remain on continuously but it will just stop blinking.

To cancel the Positioning function, press and hold the keypad button at any time during the procedure: the F1 LED will stop blinking.

Positioning (F1) yellow

Figure 5 – Positioning Function

Restore Default (Optional)

At any time you can use the *Restore Default* procedure to return the reader to the factory default settings.

1. Enter the *Restore Default* function *(F3)* by pressing and holding the push button until both the F1 and F2 LEDs are on.
2. Release the button to perform the *Restore Default* function.

Restore Default (F3) = F1 yellow + F2 green

Figure 6 – Restore Default Function

STEP 4 – INSTALLING VISISET™ CONFIGURATION PROGRAM

VisiSet™ is a Datalogic reader configuration tool providing several important advantages:

- Autolearning Wizard for new users;
- Defined configuration directly stored in the reader;
- Communication protocol independent from the physical interface allowing to consider the reader as a remote object to be configured and monitored.

To install VisiSet™, turn on the PC that will be used for the configuration, running Windows 98, 2000/NT or XP, then insert the VisiSet™ CD-ROM, wait for the CD to autorun and follow the installation procedure.

This configuration procedure assumes a laptop computer, running VisiSet™, is connected to the reader's auxiliary port.

Wizard for Quick Reader Setup

After installing and running the VisiSet™ software program the following window:

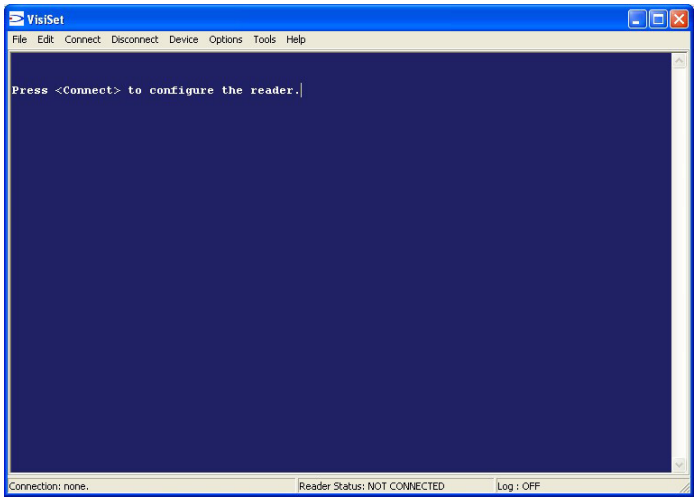


Figure 7 - VisiSet™ Opening Window

Set the communication parameters from the "Options" menu. Then select "Connect", the following window appears:

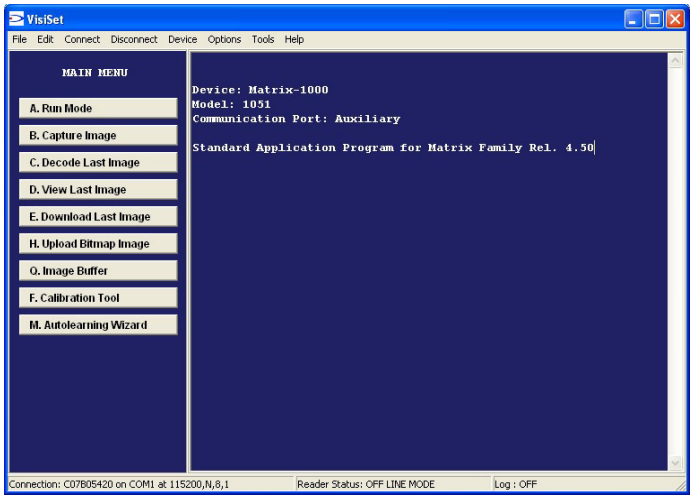
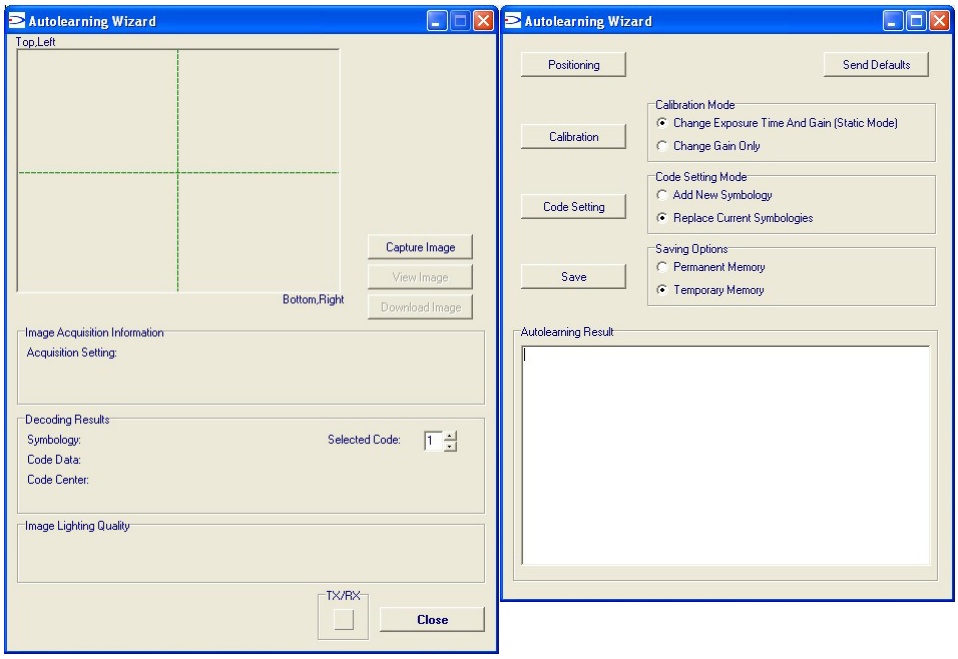


Figure 8 - VisiSet™ Main Window After Connection

The Autolearning Wizard option is advised for rapid configuration or for new users. It allows reader configuration in a few easy steps.

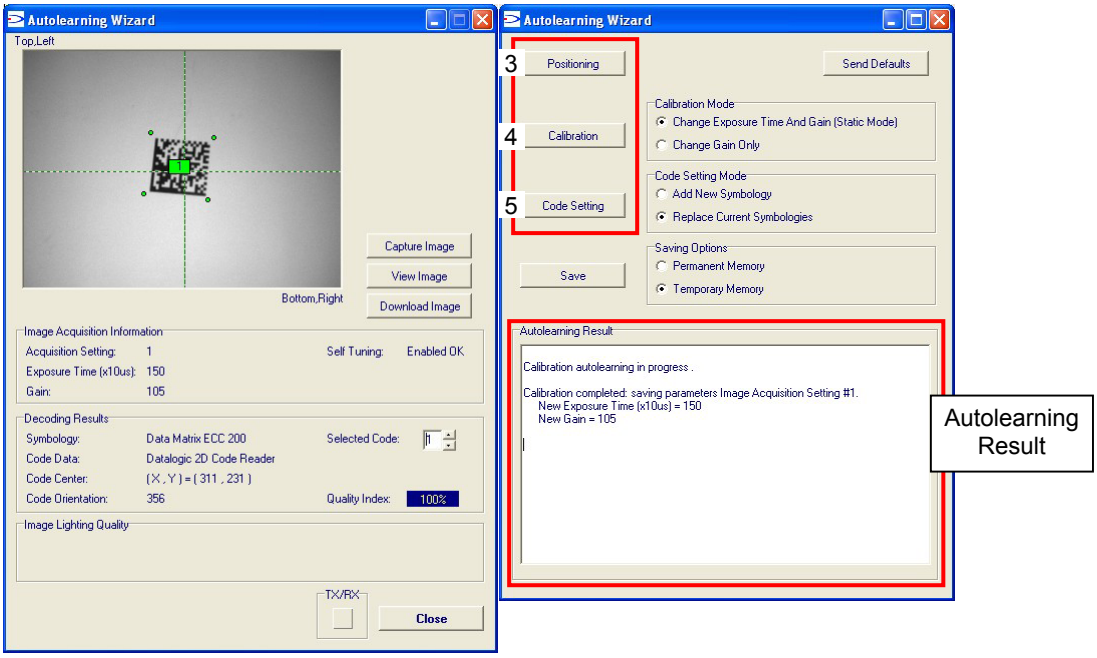
1. Select the Autolearning Wizard button from the Main menu.



2. Place the desired code in front of the reader at the correct reading distance (depending on the model, see the Reading Features table in the Appendix of this Quick Reference Guide).

3. Press the "Positioning" button. The reader continuously acquires images and gives visual feedback in the view image window to indicate when the code is centered with respect to the reader's FOV. Move the reader (or code) to center it. Press the Positioning button again to stop positioning.

4. Select a Calibration Mode choice and press the "Calibrate" button.

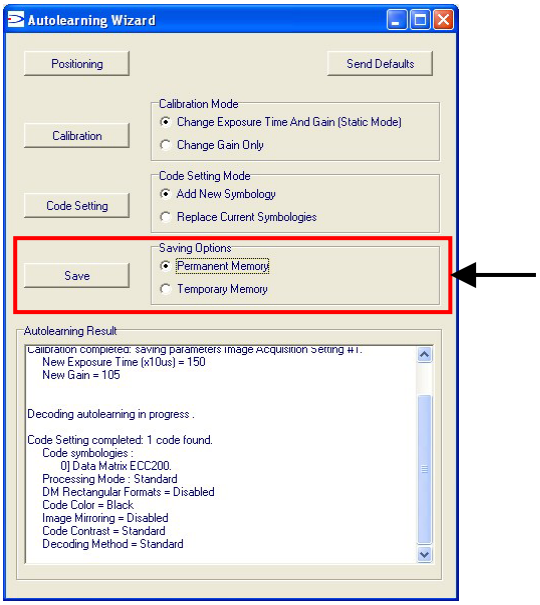


The reader flashes once acquiring the image and auto determines the best exposure and gain settings. If the code symbology is enabled by default, the code will also be decoded.

5. If the code symbology is not enabled by default, select a Code Setting Mode choice and press the "Code Setting" button.

The Autolearning Result section of the Autolearning Wizard window shows the parameter settings and the code type results.

6. Select a Saving Options choice and press the "Save" button.



7. Close the AutoLearning Wizard.

NOTE

If your application has been configured using the VisiSet™ Autolearning Wizard, your reader is ready. If necessary you can use VisiSet™ for advanced reader configuration.

ADVANCED READER CONFIGURATION

For further details on advanced product configuration, refer to the VisiSet™ Help On-Line.

The following are alternative or advanced reader configuration methods:

Advanced Configuration Using VisiSet™

Advanced configuration can be performed through the VisiSet™ program by selecting *Device> Get Configuration From Temporary Memory* to open the Parameter Setup window in off-line mode. Advanced configuration is addressed to expert users being able to complete a detailed reader configuration. The desired parameters can be defined in the various folders of the Parameter Setup window and then sent to the reader memory (either Temporary or Permanent):

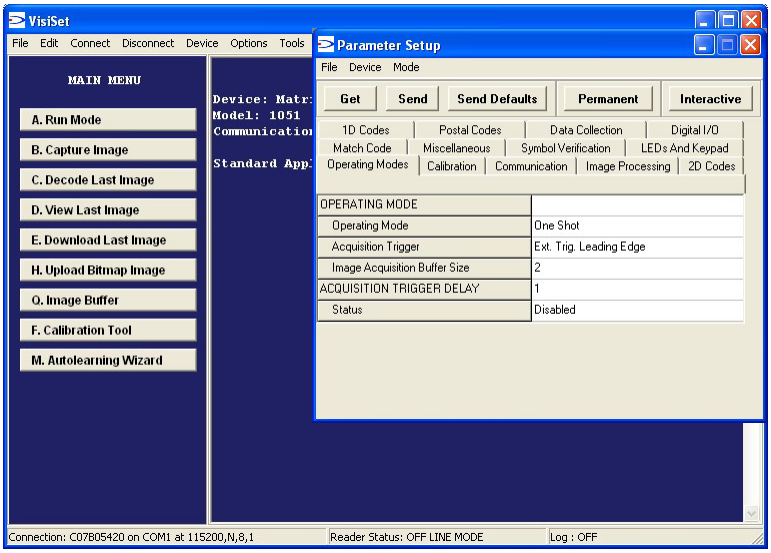


Figure 9 - VisiSet™ Parameter Setup Window

Host Mode Programming

The reader can also be configured from a host computer using the Host Mode programming procedure, by commands via the serial interface. See the Host Mode Programming file on the CD-ROM.

Alternative Layouts

If you need to install a Multiplexer network refer to par. 3.6.

2 GENERAL FEATURES

2.1 INTRODUCTION

Matrix-1000™ is an area CCD reader for industrial application using 2D, 1D, stacked and postal codes.

Matrix-1000™ uses imaging technology and provides complete reading system functions by integrating: lighting system, image acquisition, image processing, decoding and communication into a single compact unit.

This technology intrinsically provides omni-directional reading.

Standard Application Program

A Standard Application Program is factory-loaded onto Matrix-1000™. This program controls code reading, data formatting, serial port, and many other operating and control parameters. It is completely user configurable from a Laptop or PC using the dedicated configuration software program VisiSet™, provided on CD-ROM with the reader.

There are different programmable operating modes to suit various code reading system requirements.

Quick, automatic calibration and positioning of the reader can be accomplished using the Autolearning button and LEDs on top of the reader without the necessity of a PC.

Autolearning can also be performed through VisiSet™ through the Autolearning Wizard. This tool includes visual feedback from the reader.

VisiSet™ provides a Calibration Tool to verify the exact positioning of the reader and to maximize its reading performance.

Statistics on the reading performance can also be visualized through a dedicated window in VisiSet™.

Programmability

If your requirements are not met by the Standard Application Program, Custom Application Programs can be requested at your local Datalogic distributor.

2.2 DESCRIPTION

Some of the main features of this reader are given below:

- Decoding of most popular linear and stacked barcodes, 2D code symbologies and postal codes
- Omni-directional reading
- Quick installation without PC by using Autolearning button and F1, F2 LEDs
- Frame rate up to 30 frames/sec (1800 frames/min)
- Moving Code Reading
- Calibration Tool to verify exact code positioning in the Field of View and to maximize the reading performance
- Parameter configuration via Windows-based VisiSet™ software
- Code quality assessment according to ISO/IEC 16022, ISO/IEC 18004 standards.
- Different operating modes to suit various application requirements
- User-defined database of Image Acquisition Settings (parameter sets)
- Match Code option with a user-defined match code database
- Diagnostic software tools
- 2 serial communication interfaces
- General purpose optocoupled I/Os
- Supply voltage ranges from 10 to 30 Vdc

The reader is contained in a magnesium alloy housing; the mechanical dimensions are 121 x 73 x 57 mm and it weighs about 330 g.

The protection class of the enclosure is IP64; therefore the reader is particularly suitable for industrial environments where protection against harsh external conditions is required.

Electrical connection of Power, Host interfaces and I/O signals is provided through a 25-pin connector (see Figure A, 9). In addition there is a 9-pin Auxiliary interface connector for reader configuration (see Figure A, 10).

The following indicators are located on the top of the reader:

PWR red LED indicates that the reader is connected to the power supply (see Figure A, 5);

TRIG yellow LED indicates external trigger activity (Figure A, 6); for details refer to par 3.3.4;

READ red LED signals successful code decoding (Figure A, 7).
It is also used to signal successful startup. At power on this LED turns on and after a few seconds turns off. If the startup is not successful, this LED remains on.

COM green LED indicates data transmission on the main serial interface (Figure A, 8).

F1 yellow LED signals distance of code from the center of FOV during the Positioning (Optional) procedure. The faster it blinks, the better Matrix-1000™ is positioned (see Figure A, 4).

F2 green LED signals reader calibration with respect to image quality during the Auto Learn procedure (see Figure A, 2).

The keypad button is software programmable. By default it starts the Auto Learn or Positioning procedure to calibrate and position the reader for quick installation without using a PC (see Figure A, 3).

2.3 MODEL DESCRIPTION

The Matrix-1000™ reader is available in different versions according to the following characteristics:

MATRIX - 10X1

↓

Optics

2 = High Density (HD)
3 = Standard Density (SD)
4 = Low Density (LD)
5 = Medium Range (MR)

2.4 ACCESSORIES

Order No.	Accessory	Description
93A051190	CAB-6001	Cable to C-BOX100 1 m
93A051200	CAB-6002	Cable to C-BOX100 2 m
93A051210	CAB-6005	Cable to C-BOX100 5 m
93A051271	CAB-6010	Cable to C-BOX100 10 m
93ACC1510	C-BOX 100	Passive Connection Box
93A301000	C-BOX 300	Connection Box PROFIBUS
93A301030	C-BOX 310	Connection Box PROFIBUS with display
93A301010	C-BOX 400	Connection Box DeviceNet
93A301040	C-BOX 410	Connection Box DeviceNet with display
93ACC1718	PG6002	AC/DC Power Supply Unit (US)
93ACC1719	PG6001	AC/DC Power Supply Unit (UK)
93ACC1720	PG6000	AC/DC Power Supply Unit (EU)
93ACC1791	PH-1	Photocell Kit
93ACC1727	MEP- 542	Photocell Kit-PNP
93ACC1728	MEP- 543	Photocell Kit-NPN
93A401003	LT-100	Cone Lighting System
93A401004	LT-200	Spot Lighting System
93A401012	LT-210	Mini-Spot Lighting System
93A401008	LT-300	Ring Lighting System
93A401013	LT-314	45° Dark Field Ring Lighting System
93A401014	LT-316	60° Dark Field Ring Lighting System
93A401015	LT-410	Coaxial Lighting System
93A401016	LT-510	Mini-Dome Lighting System
93A401017	LT-511	Dome Lighting System
93ACC1786	BK-410	Coaxial Lighting System Bracket
93ACC1787	BK-510	Mini-Dome Lighting System Bracket
93ACC1788	BK-511	Dome/Ring Lighting System Bracket
93ACC1729	USX-60	Adjustable Bracket
93A201090	GFC-MATRIX-2000	90° Deflection Mirror

2.5 APPLICATION EXAMPLES

The Matrix-1000™ wide choice of fields of view and high performance of decoding libraries allow the reading of many small codes (see 96 vial application in Figure 10) as well as deformed and / or overprinted codes also when they are damaged or printed on high reflective surfaces (see Figure 11, Figure 12, Figure 13).

Figure 10 - 96-vial Rack with Data Matrix Codes for Individual Biomedical Analysis Process Tracking

Figure 11 - Unidose Flow-Pack with PDF417 Code

Figure 12 - Overprinted Barcode Readable by Matrix-1000™ also Through the Envelope Window Film

Figure 13 - Barcode Printed on Curved Surface Readable by Matrix-1000™ in spite of Image Optical Distortion

The Matrix-1000™ is particularly suitable for applications requiring an array of readers to cover a very large reading area (see Figure 14).

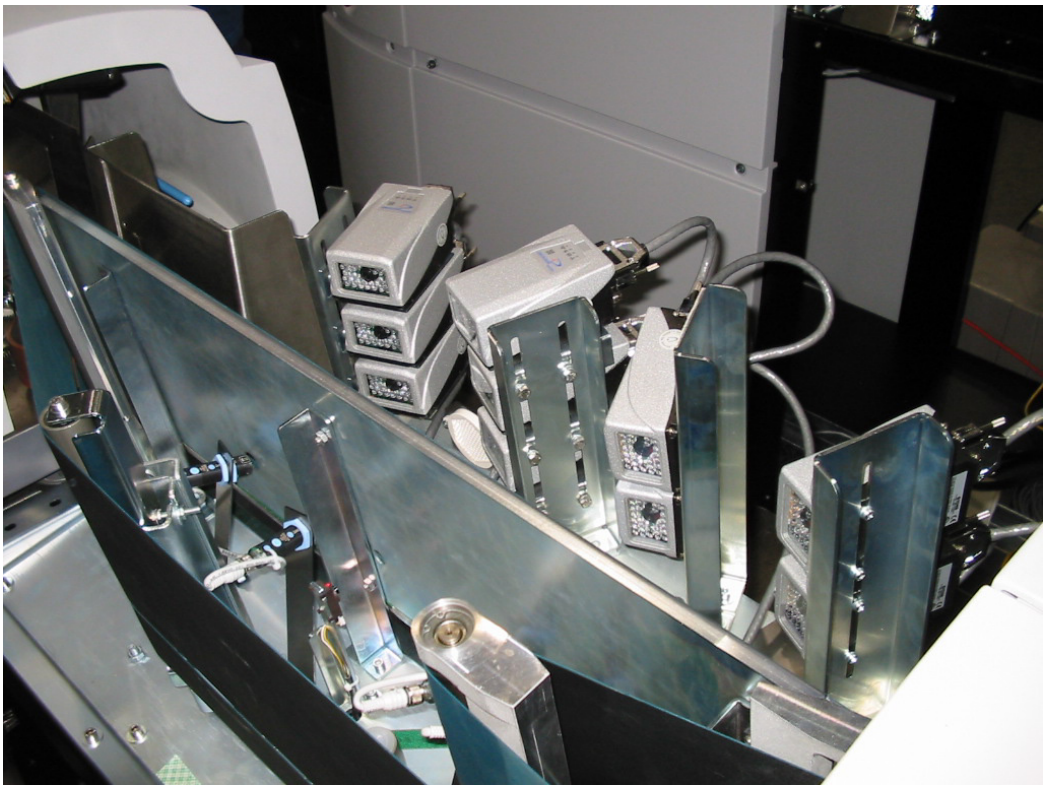


Figure 14 - Ten readers connected to a Datalogic MX4000 through a multidrop network.

3 INSTALLATION

3.1 PACKAGE CONTENTS

Verify that the Matrix-1000™ reader and all the parts supplied with the equipment are present and intact when opening the packaging; the list of parts includes:

- ❑ Matrix-1000™ reader
- ❑ Quick Reference Guide
- ❑ Test chart
- ❑ Matrix family CD-ROM
- ❑ Auxiliary port connector cover
- ❑ Mounting kit
  - Mounting screws and washers (4 ea.)
  - Mounting bracket

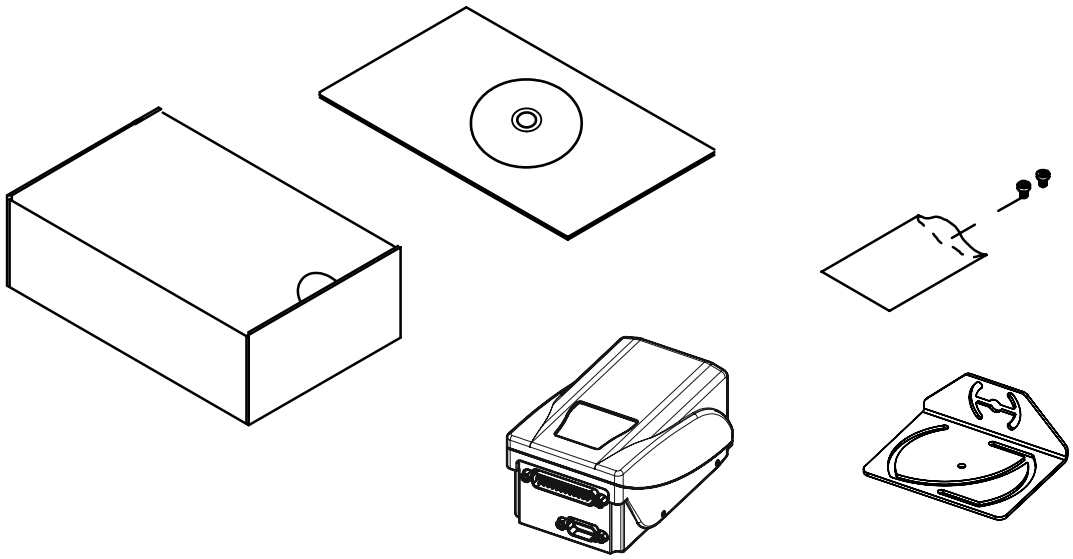


Figure 15 - Package Contents

3.2 MECHANICAL INSTALLATION

Matrix-1000™ can be installed to operate in different positions. The eight screw holes (M4 x 5) on the body of the reader are for mechanical fixture (Figure 16).

The diagram below gives the overall dimensions of the reader and may be used for its installation.

Refer to paragraph 3.5 for correct positioning.

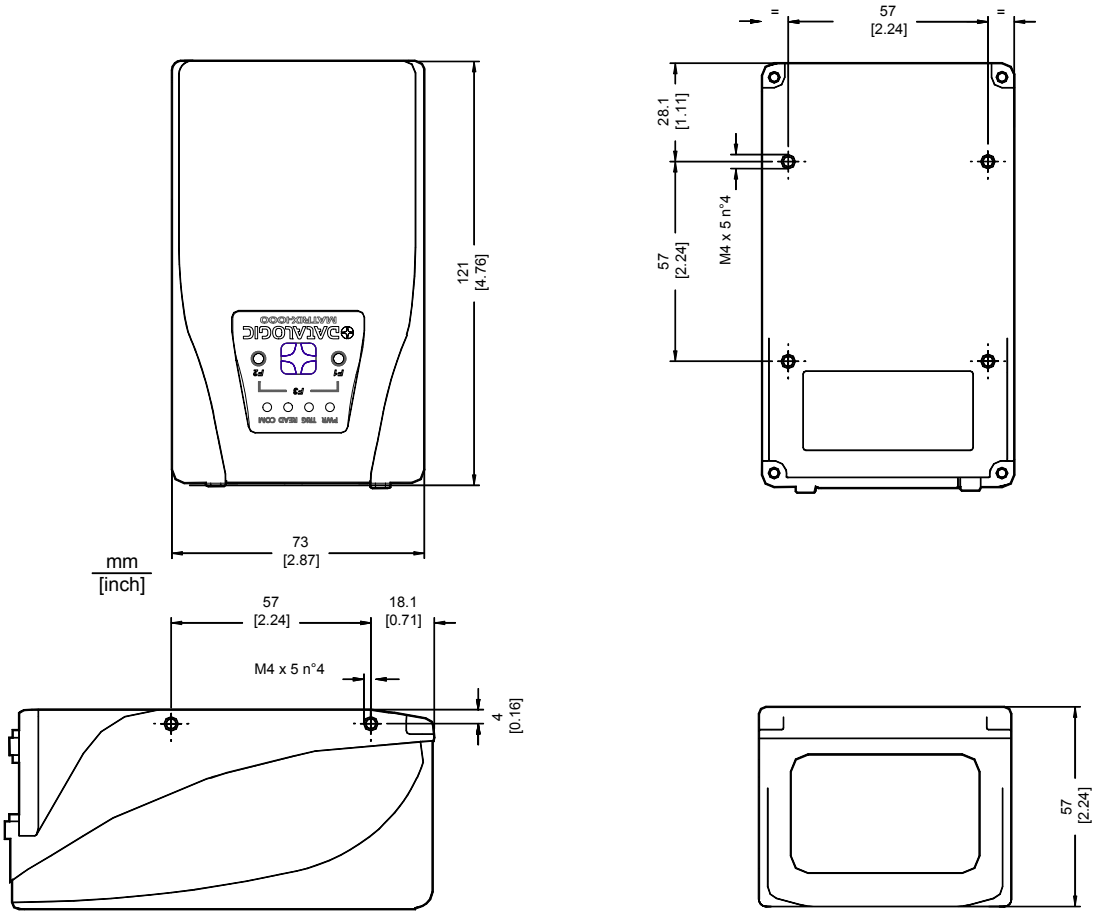


Figure 16 - Overall Dimensions

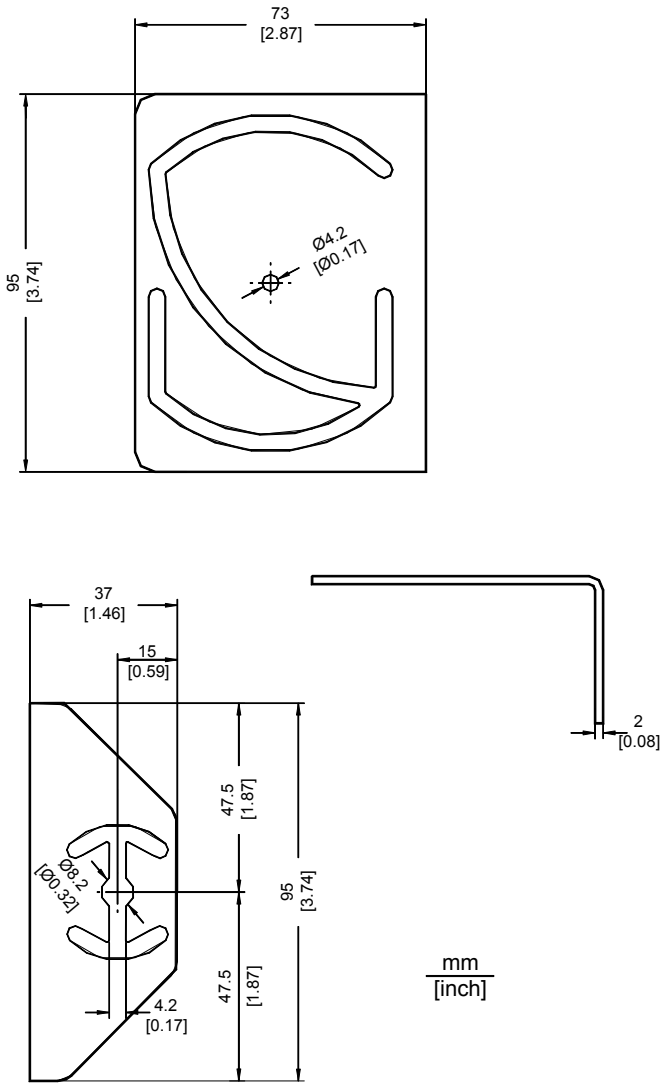


Figure 17 - Mounting Bracket Overall Dimensions

3.2.1 Mounting Matrix-1000™

Using the Matrix-1000™ mounting bracket you can obtain vertical shift and rotation of the reader as shown in the diagram below:

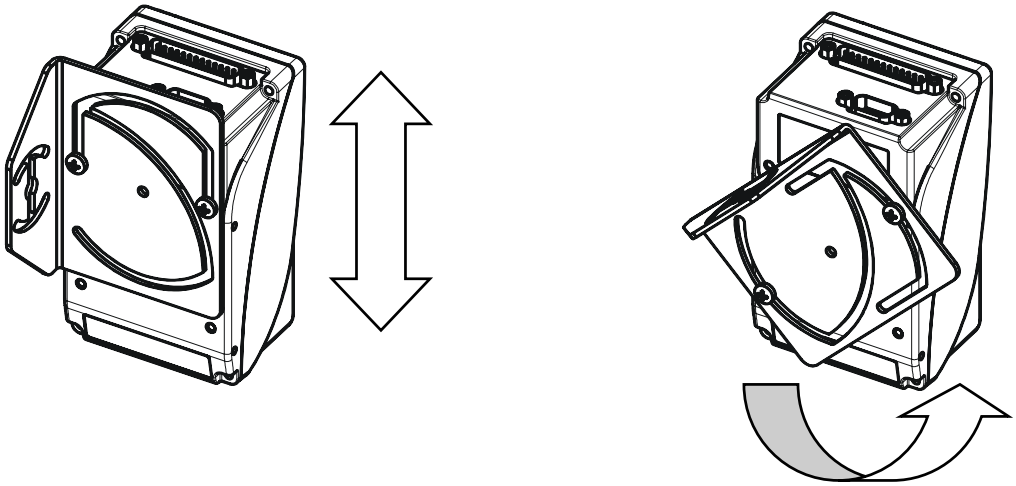


Figure 18 - Positioning with Mounting Brackets

3.3 ELECTRICAL CONNECTIONS

The Matrix-1000™ reader is equipped with a 25-pin male D-Sub connector for connection to the power supply and input/output signals. The details of the connector pins are indicated in the following table:

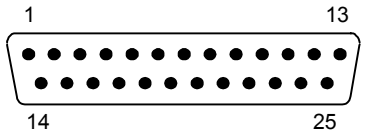


Figure 19 - 25-pin male D-Sub Connector

25-pin male D-sub connector pinout		
Pin	**Name**	**Function**
1	SHIELD	Cable shield internally connected by capacitor to the chassis
2	RTX485+	Rx or Tx data of RS485 Half Duplex Main Interface - positive pin
4	RTX485-	Rx or Tx data of RS485 Half Duplex Main Interface - negative pin
7	SGND	Reference GND of RS485 Half Duplex Main Interface
3,5	NC	Not connected
20	RXAUX	Received data of RS232 Auxiliary Interface (referred to GND)
21	TXAUX	Transmitted data of RS232 Auxiliary Interface (referred to GND)
8, 22	NC	Not connected
11, 12	NC	Not connected
16	OUT 3 +	Configurable digital output 3 - positive pin
17	OUT 3 -	Configurable digital output 3 - negative pin
18	EXT_TRIG A	External trigger (polarity insensitive)
19	EXT_TRIG B	External trigger (polarity insensitive)
6, 10	NC	Not connected
14, 15, 24	NC	Not connected
9,13	VS	Supply voltage - positive pin
23, 25	GND	Supply voltage - negative pin

There is also a separate 9-pin female D-sub connector for the Auxiliary port connection with the following pinout:

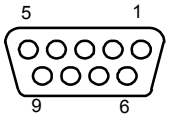


Figure 20 - 9-pin female D-Sub Connector

9-pin female D-sub connector pinout		
Pin	**Name**	**Function**
2	TXAUX	Transmitted data of auxiliary RS232
3	RXAUX	Received data of auxiliary RS232
5	GND	Reference GND of auxiliary RS232
1,4,6,7,8,9	N.C.	Not connected

CAUTION

Avoid simultaneous connection to 25-pin and 9-pin signals of the auxiliary RS232 interface.

CAUTION

When connected to a C-BOX 3x0/4x0, Matrix-1000™ can only communicate through its Auxiliary Interface. The Matrix-1000™ 9-pin Auxiliary port connector cannot be used for communication (i.e. configuration through VisiSet™). To configure Matrix-1000™ through the 9-pin connector inside the C-BOX 3x0/4x0, the C-BOX 3x0/4x0 must first be configured. See the relative C-BOX Installation Manual for details.

CAUTION

Do not connect GND and SGND to different (external) ground references. GND and SGND are internally connected through filtering circuitry which can be permanently damaged if subjected to voltage drops over 0.8 Vdc.

In order to meet EMC requirements:

- connect the reader chassis to the plant earth ground by means of a flat copper braid shorter than 100 mm;
- connect the main interface cable shield to pin 1 of the 25-pin connector;
- use two clip-on ferrite sleeves (type Stewart 28A2029-0A0 or equivalent) on the main interface cable near the reader 25-pin connector;

C-BOX 100 pinout for Matrix-1000™

The table below gives the pinout of the C-BOX 100 terminal block connectors. Use this pinout when the Matrix-1000™ reader is connected by means of the C-BOX 100:

C-BOX 100 Terminal Block Connectors	
Power	
1, 3, 5	VS
2, 4, 6	GND
7, 8	EARTH GROUND
20, 40	Reserved
Inputs	
27	EXT TRIG A (polarity insensitive)
28	EXT TRIG B (polarity insensitive)
29, 30	NC
31, 33	NC
32, 34	NC
36	NC
Outputs	
21, 22	NC
23, 24	NC
25	OUT 3+
26	OUT 3-
Auxiliary Interface	
35	TX AUX
37	RX AUX
38, 39	GND
Main Interface	
	RS485 Half-Duplex
11, 15	RTX485+
12, 16	RTX485-
17	NC
18	NC
10, 14, 19	SGND
9, 13	RS485 Cable Shield

3.3.1 Power Supply

Power is supplied to the reader through the pins provided on the 25-pin connector (see Figure 21):

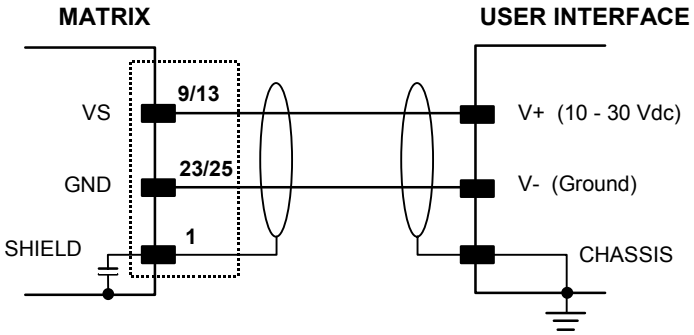


Figure 21 - Power Supply Connection

The allowed supply voltage range is 10 to 30 Vdc.

3.3.2 RS485 Half-Duplex Interface

The RS485 half-duplex (3 wires + shield) interface is available for polled communication protocols.

It can be used for multidrop connections with a Datalogic Multiplexer, (see Figure 22 and par. 3.6.2).

The following pins of the 25-pin connector are used for RS485 half-duplex communication:

Pin	Name	Function
2	RTX485+	Transmitted/received data (+)
4	RTX485-	Transmitted/received data (-)
7	SGND*	Main reference ground

*SGND is internally connected to the GND through a filtering circuit.

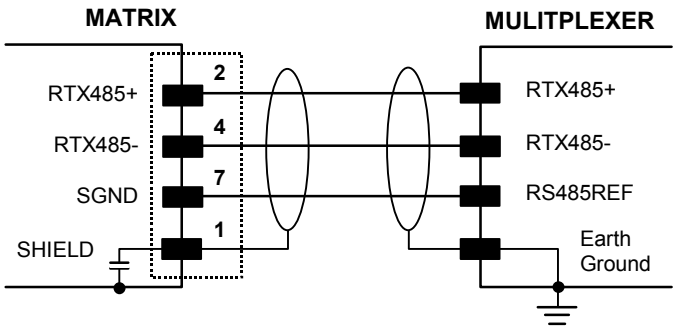


Figure 22 - RS485 Half-Duplex Connections

The figure below shows a multidrop configuration with Matrix-1000™ readers connected to a Multiplexer.

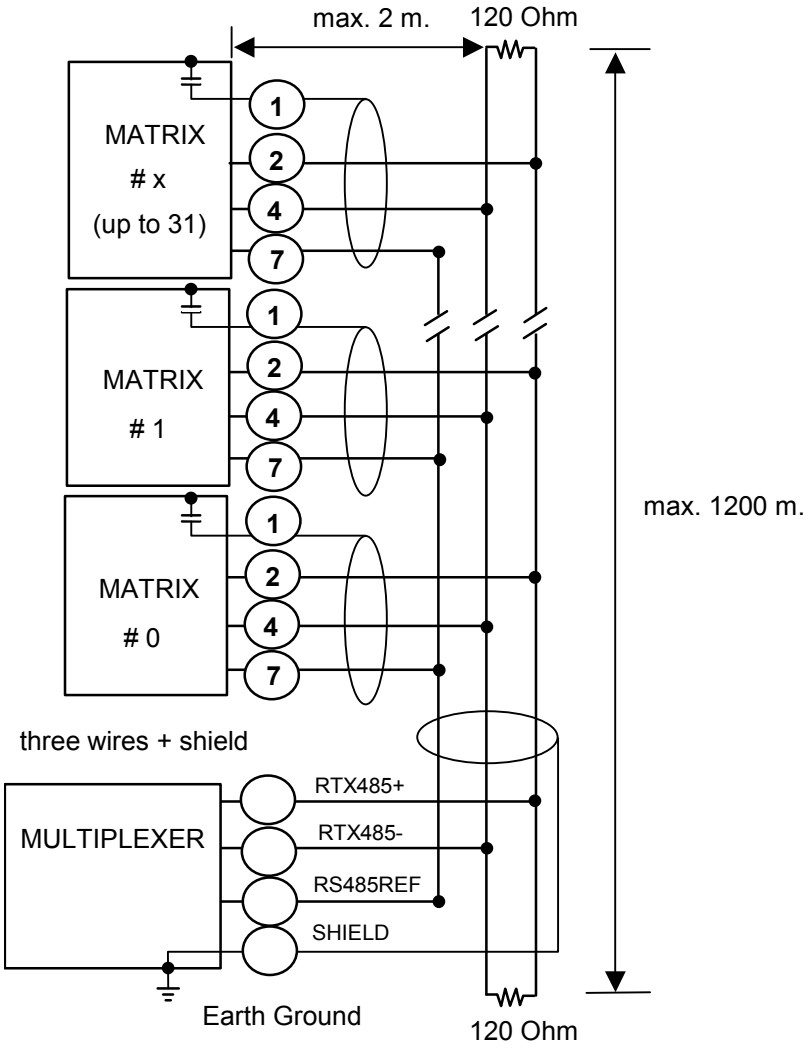


Figure 23 - Matrix-1000™ Multidrop Connection to a Mutiplexer

3.3.3 Auxiliary RS232 Interface

The RS232 auxiliary interface is available for Point-to-Point connections. When it is connected to the host computer it allows both transmission of code data and reader configuration by VisiSet™.

Its communication parameters (baud rate, data bits, etc.) can be defined by the user. For more details refer to the "Communication" folder in the VisiSet™ Help On Line.

The auxiliary interface is available on both D-sub connectors with the following pinouts:

9-Pin	25-Pin	Name	Function
2	21	TXAUX	Transmitted data
3	20	RXAUX	Received data
5	23	GND	Ground

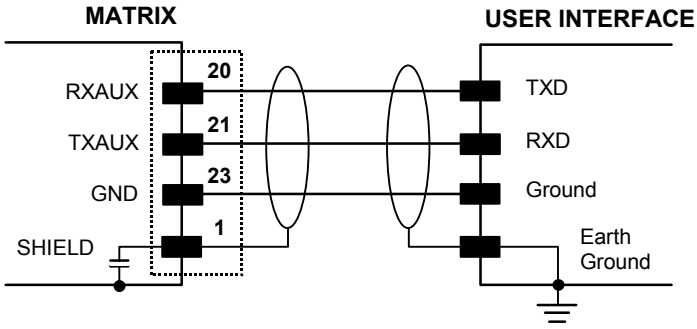


Figure 24 - RS232 Auxiliary Interface Connections Using 25-pin Connector

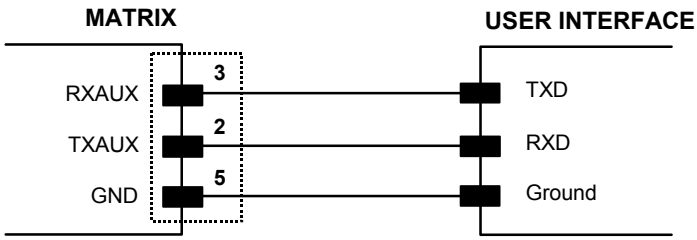


Figure 25 - RS232 Auxiliary Interface Connections Using 9-pin Connector

When the auxiliary interface is permanently connected as part of the system cabling, it is recommended to use the 25-pin connector and connect the cable shield as shown in Figure 24.

CAUTION

Avoid simultaneous connection to 25-pin and 9-pin signals of the auxiliary RS232 interface.

CAUTION

When connected to a C-BOX 3x0/4x0, Matrix-1000™ can only communicate through its Auxiliary Interface. The Matrix-1000™ 9-pin Auxiliary port connector cannot be used for communication (i.e. configuration through VisiSet™). To configure Matrix-1000™ through the 9-pin connector inside the C-BOX 3x0/4x0, the C-BOX 3x0/4x0 must first be configured. See the relative C-BOX Installation Manual for details.

3.3.4 Input

An opto-coupled and polarity insensitive input is available on the 25-pin connector. The pinout is the following:

Pin	Name	Function
18	EXT_TRIG A	External trigger (polarity insensitive)
19	EXT_TRIG B	External trigger (polarity insensitive)

When current flows through the EXT_TRIG input, the yellow LED (Figure A, 6) is on.

The External Trigger can be used in One Shot Mode or in Phase Mode. Its main functions are:

- acquisition trigger in One Shot Mode
- reading phase-ON/reading phase-OFF command in Phase Mode
- match code storage command when the Match Code option is enabled

This input can be driven by either a PNP or NPN type command. The connections are indicated in the following diagrams:

NOTE

Polarity insensitive input assures full functionality even if pins A and B are exchanged.

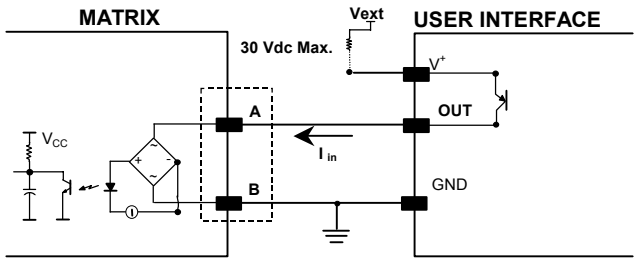


Figure 26 - Input PNP Command Using External Power

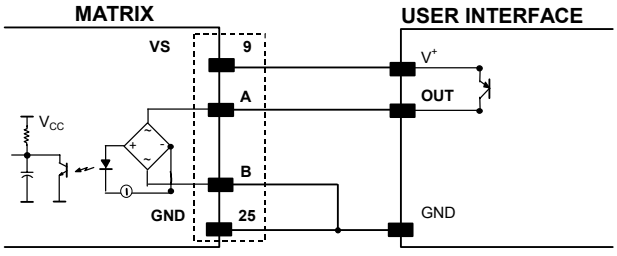


Figure 27 - Input PNP Command Using Matrix-1000™ Power

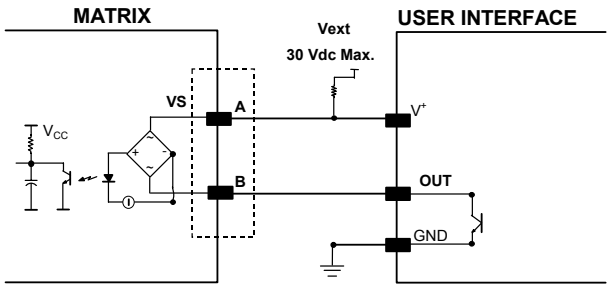


Figure 28 - Input NPN Command Using External Power

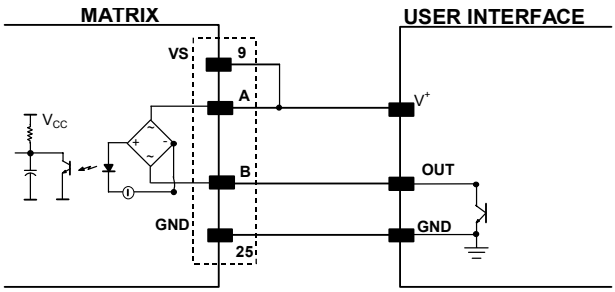


Figure 29 - Input NPN Command Using Matrix-1000™ Power

The electrical features of the input are:

INPUT	$\lvert V_{AB} \rvert$ Min.	$\lvert V_{AB} \rvert$ Max.	I_{IN} Max.
Open	0 V	2 V	0 mA
Closed	4.5 V	30 V	10 mA

An anti-disturbance filter (debounce filter) is implemented on the input, and is software programmable. The input active state can be defined by the user as well. Refer to the Digital I/O folder in the VisiSet™ Help On Line for further details.

3.3.5 Output

One optocoupled general purpose output is available on the 25-pin connector. The pinout is the following:

Pin	Name	Function
16	OUT3+	Configurable digital output 3 - positive pin
17	OUT3-	Configurable digital output 3 - negative pin

It is typically used to signal the data collection result. It can also be used to control an external lighting system.

The idle state, the activation/deactivation events and the other configuration parameters can be defined by the user. Refer to the Digital I/O folder in the VisiSet™ Help On Line for further details.

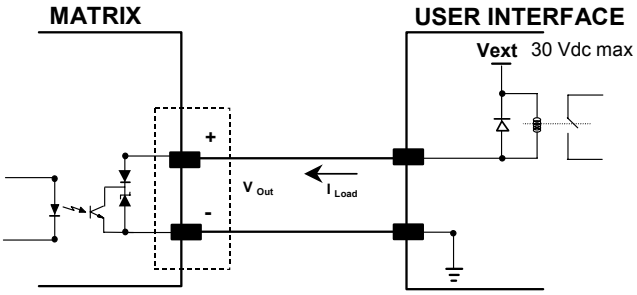


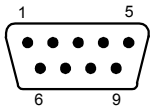
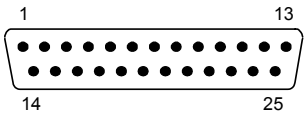
Figure 30 - Open Collector Output Connection

The electrical features of the output are the following:

OUTPUT	I_{Load}	V_{Out}
Open	0 mA	30 Vdc Max
Closed	10 mA	1.8 Vdc Max

$P_D = V_{Out} \times I_{oLoad}$ = 170 mW Max.

3.4 USER INTERFACE

RS232 PC-side connections			
 9-pin male connector		 25-pin male connector	
Pin	**Name**	**Pin**	**Name**
2	RX	3	RX
3	TX	2	TX
5	GND	7	GND
7	RTS	4	RTS
8	CTS	5	CTS

How To Build A Simple Interface Test Cable:

The following wiring diagram shows a simple test cable including power, external (push-button) trigger and PC RS232 COM port connections.

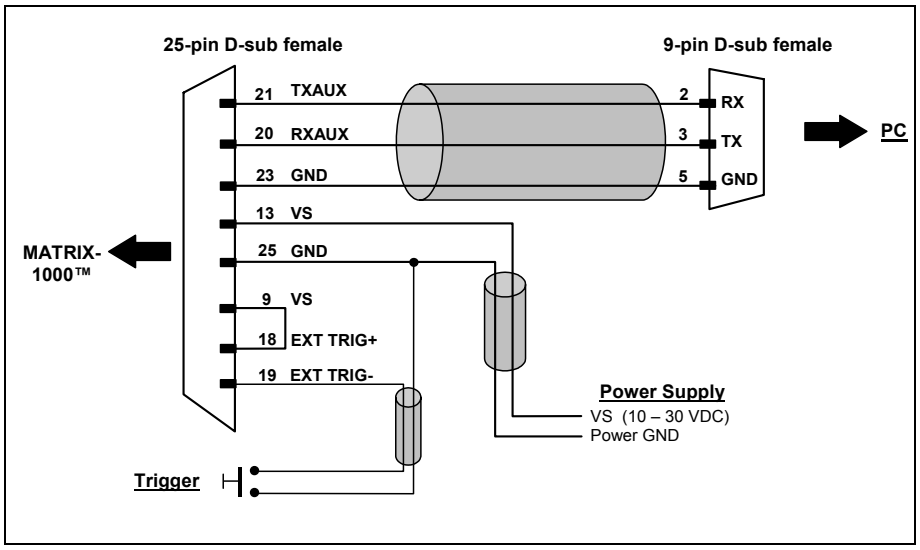


Figure 31- Test Cable for Matrix-1000™

3.5 POSITIONING

Position the reader so that the distance from the reading window to the code surface is that indicated in the figure below for your model.

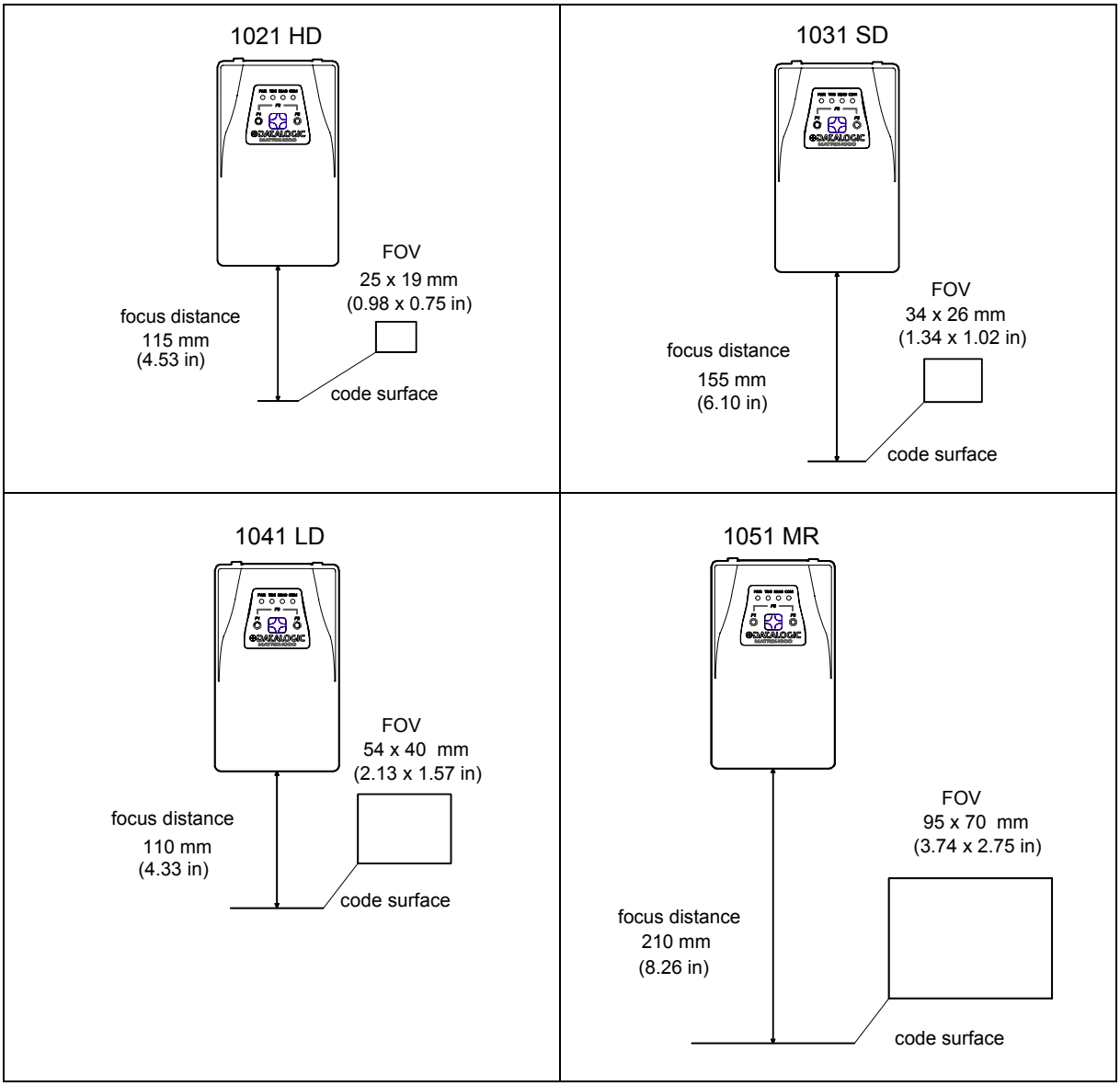


Figure 32 – Positioning

Special models with different FOV and focus distance are available on request. Refer to your local Datalogic distributor.

Matrix-1000™ is able to decode code labels at a variety of angles, however significant angular distortion may degrade reading performance.

When mounting Matrix-1000™, take into consideration these **ideal** label position angles: **Pitch 10° to 20° and Tilt 0°**.

Note: Since Matrix-1000™ is omni-directional on the code plane, the Pitch and Skew angles have the same significance with respect to the code plane. However in some advanced code reading applications performance can be improved by modifying the Skew angle.

Follow the suggestions below for the best orientation:

The **Pitch and Skew** angles are represented by the values **P** and **S** in Figure 33 and in Figure 34. Position the reader in order to avoid the direct reflection of the light emitted by the Matrix-1000™ reader; it is advised to **assure at least 10°** for one of these angles. In some cases, such as low contrast or low illumination, it can be useful to use a **Pitch or Skew** angle = 0°.

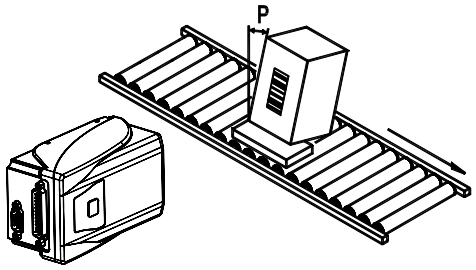


Figure 33 - Pitch angle

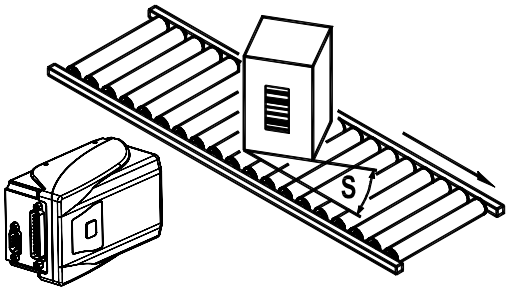


Figure 34 - Skew angle

The **Tilt** angle is represented by the value **T** in Figure 35. Matrix-1000™ can read labels with any tilt angle.

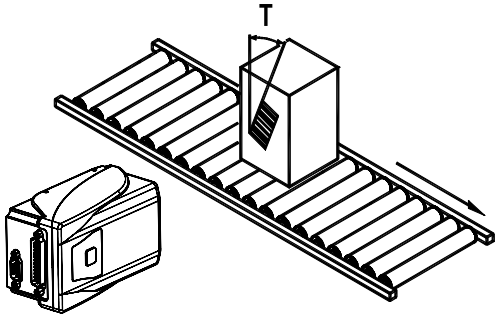


Figure 35 - Tilt angle

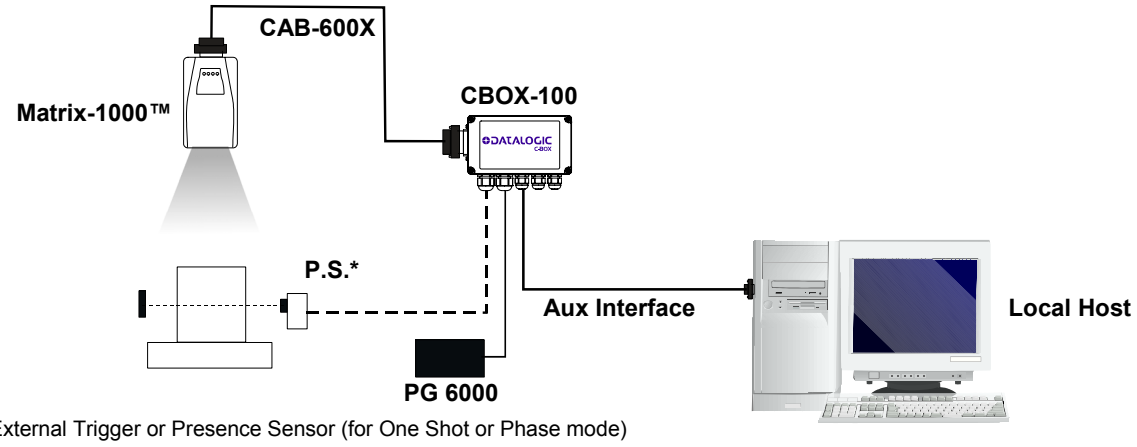
3.6 TYPICAL LAYOUTS

The following typical layouts refer to system hardware configurations. However, they also require the correct setup of the software configuration parameters. Dotted lines in the figures refer to optional hardware configurations within the particular layout.

3.6.1 Point-to-Point

In this layout the data is transmitted to the Host on the Matrix-1000™ RS232 auxiliary serial interface which is also used for reader configuration by running VisiSet™.

When One Shot or Phase Mode Operating mode is used, the reader is activated by an External Trigger (photoelectric sensor) when the object enters its reading zone.



* External Trigger or Presence Sensor (for One Shot or Phase mode)

Figure 36 - Point-to-Point Layout

3.6.2 Multiplexer

Each reader is connected to a MX4000 through a multidrop network. Before proceeding with the connection it is necessary to select the MUX32 communication protocol and the multidrop address for each reader.

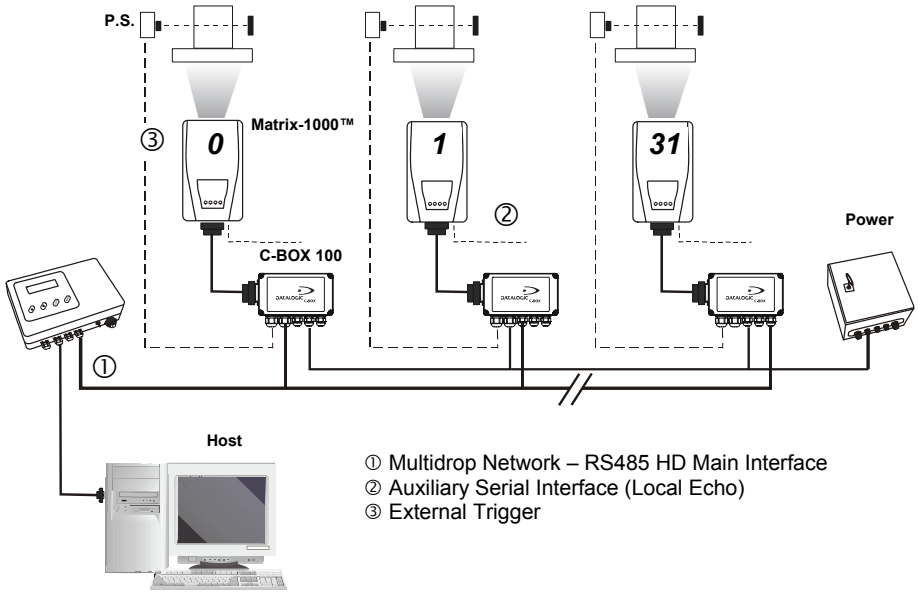


Figure 37 - Multiplexer Layout

The auxiliary serial interface of each reader can be used for configuration purposes, using VisiSet™, or in Local Echo communication mode to control the single device operation.

4 SOFTWARE CONFIGURATION

Software configuration of your Matrix-1000™ for static reading or simple code reading applications can be accomplished by the Autolearning Procedure (which requires no external configuration program or by using the VisiSet™ Autolearning Wizard for easy setup. These procedures are described in chapter 1.

For all other applications, software configuration can be accomplished by VisiSet™ through the Matrix-1000™ auxiliary serial port.

4.1 VISISET™ SYSTEM REQUIREMENTS

To install and run VisiSet™ you should have a Laptop or PC that meets or exceeds the following:

- Pentium processor
- Win 95/98/2000, NT 4.0 or XP
- 32 MB Ram
- 5 MB free HD space
- one free RS232 serial port with 115 Kbaud
- SVGA board (800x600) or better using more than 256 colors

4.2 INSTALLING VISISET™

To install VisiSet™, proceed as follows:

1. Turn on the Laptop or PC that will be used for configuration (connected to the Matrix-1000™ auxiliary port).
2. After Windows finishes booting, insert the CD-ROM provided.
3. Launch VisiSet™ installation by clicking Install.
4. Follow the instructions in the installation procedure.

4.3 STARTUP

After completing the mechanical and electrical connections to Matrix-1000™, you can begin software configuration as follows:

1. Power on the Matrix-1000™ reader. Wait for the reader startup. The system bootstrap requires a few seconds to be completed. The reader automatically enters Run Mode.
2. Run the VisiSet™ program.
3. Press **Connect** on the VisiSet™ menu bar. The PC will automatically connect to the Matrix-1000™ reader.

   Upon connection, Matrix-1000™ exits Run Mode and displays the Main Menu on VisiSet™ with all the commands necessary to monitor your reader's performance. You can select these commands using the mouse or by pressing the key corresponding to the letter shown on the button. See Figure 38.

Figure 38 - Main Window

4.3.1 VisiSet™ Options

The **Options** item from the VisiSet™ menu (see Figure 38) presents a window allowing you to configure:

- the logging function (**Log**)
- VisiSet™ window properties (**Environment**)
- VisiSet™ communication channel (**Communication**)

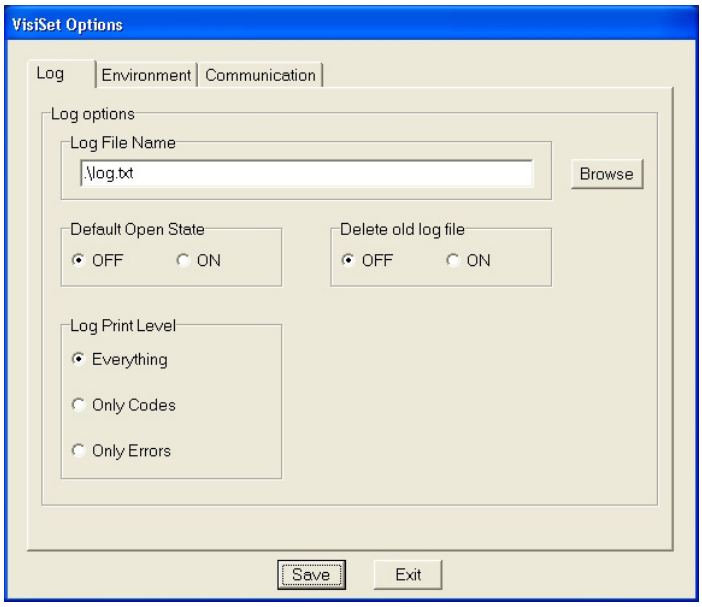


Figure 39 - Options - Log

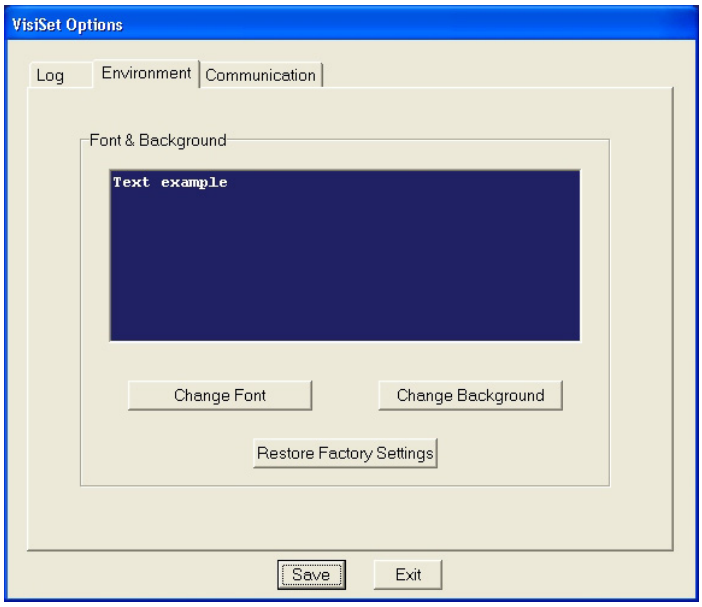


Figure 40 - Options - Environment

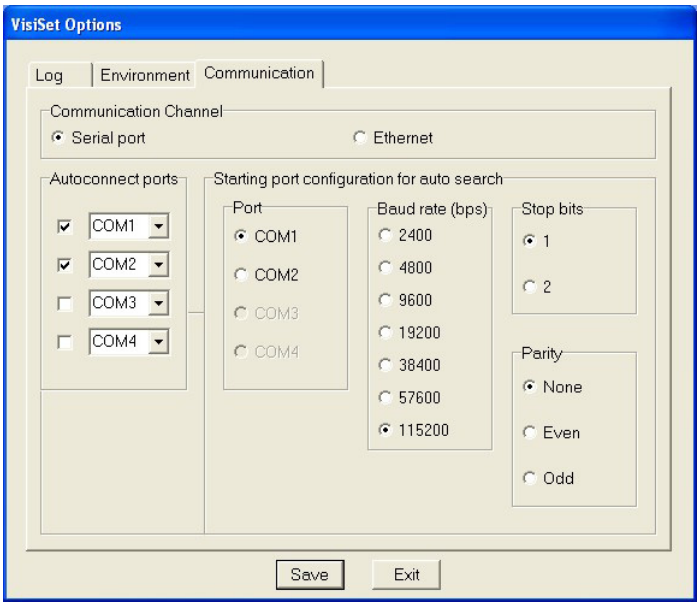


Figure 41 - Options – Communication: Serial Port

4.4 CONFIGURATION

Once connected to Matrix-1000™ as described in par. 4.3, you can modify the configuration parameters as follows:

1. Press the Calibration Tool button from the Main Menu. Matrix-1000™ will download its permanent memory configuration parameters with the default values (if it is the first time) to VisiSet™. The Calibration Tool window will be displayed together with the Parameter Setup window working in Interactive Mode (see par. 4.4.1 and par. 4.4.2).

2. Edit the Matrix-1000™ configuration parameters according to your application requirements.

3. Use the **Calibration Tool** to fine tune the reading performance. See par. 4.4.2.

4. Close the Calibration Tool window and disable the Interactive Mode by pressing the interactive button.

5. Save the new configuration to the reader permanent memory by pressing the Send button.

6. Close the Parameter Setup window and press **Disconnect** on the VisiSet™ menu bar (see Figure 38) or launch **Run** Mode from the VisiSet™ Main menu.

Disconnect exits closing communication between Matrix-1000™ and VisiSet™, and causes Matrix-1000™ to enter Run Mode. The disconnected reader serial port is now available.

Run command does not close communication between Matrix-1000™ and VisiSet™, and causes Matrix-1000™ to enter Run Mode. In this case the reader output messages are displayed on the VisiSet™ terminal and the statistics are displayed in the Statistics window (Statistics enabled).

4.4.1 Edit Reader Parameters

The Parameter Setup window displays the configuration parameters grouped in a series of folders. Each parameter can be modified by selecting a different item from the prescribed list in the box, or by typing new values directly into the parameter box.

By right clicking the mouse when positioned over the name of a specific Parameter or Group, a pop-up menu appears allowing you to directly manage that particular parameter or group.

You can **View the Selected Value** for each parameter.

You can **Restore the Default Value** of each parameter or of all the parameters of a group.

Get Properties gives information about the parameter in the form of a pop-up hint that describes the default value and the range/list of valid values.

The **Short Help** gives information about the parameter in the form of a pop-up hint.

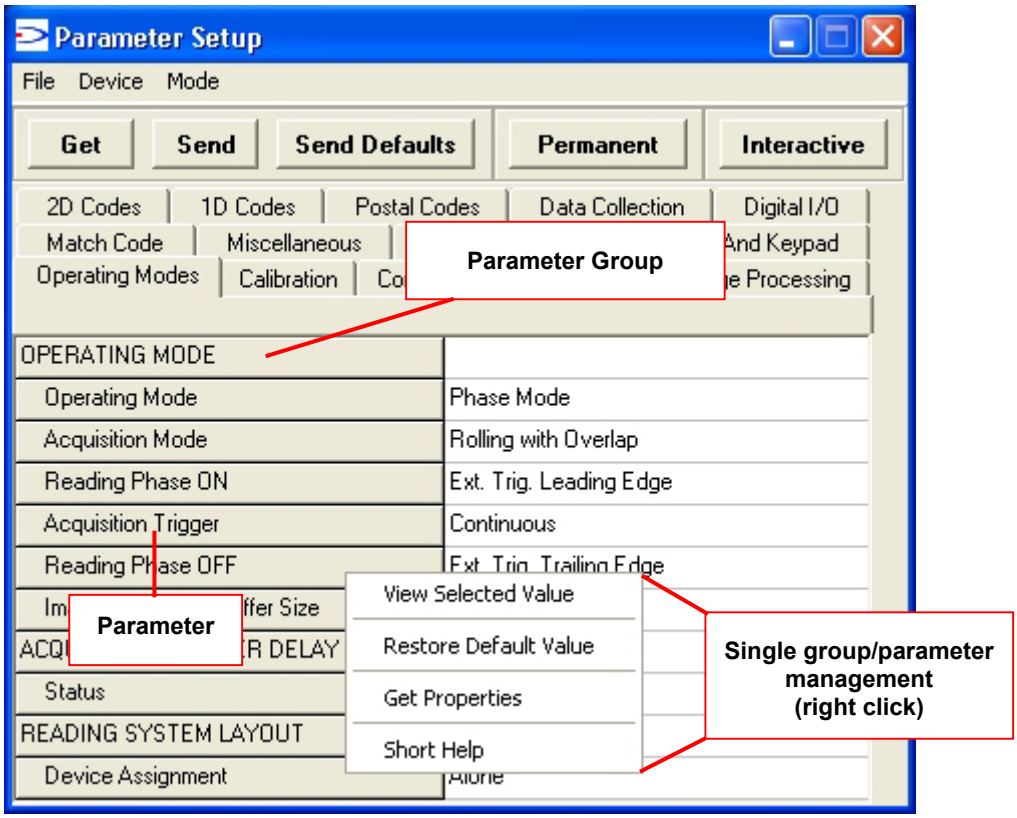


Figure 42 - Editing Parameters

Parameters to verify/modify:

❑ Operating Mode	Sets the parameters which customize the reader operating mode starting from three main modes: One Shot: acquires a single image based on the selected value for the Acquisition Trigger and Acquisition Trigger Delay. Continuous: continuously acquires images with a rate up to 30 frames per second depending on the decoding time. Phase Mode: acquires images during the reading phase depending on the selected value for the Acquisition Trigger and Acquisition Trigger Delay. The Reading Phase-ON and Reading Phase-OFF events mark respectively the beginning and end of the reading phase.
❑ Calibration	Calibrates the acquisition parameters to maximize the reading performance (see par. 4.4.2)
❑ Communication	Configures the parameters relative to each serial port regarding the transmission, message formatting and string receiving. Any change to the VisiSet™ communication port parameters (baud rate, data bits, etc.) is effective as soon as the reader is disconnected from VisiSet™.
❑ Image Processing	Sets the image processing parameters shared by all available symbologies.
❑ 1D & 2D, Postal Codes	Sets the characteristics of the code symbologies to be read.
❑ Data Collection	Defines the code-collection parameters and the output message format.
❑ Digital I/O	Configures the reader input/output parameters.
❑ Match Code	Allows setting a user-defined code and relative parameters to which the read code will be compared (matched).
❑ Miscellaneous	Sets the reader name and the saved image format.
❑ Symbol Verification	Sets the parameters relative to the various specifications in the Standards which regulate code validation.
❑ LEDs And Keypad	Sets the LED and Keypad parameters related to their selected Functions.

When all the configuration parameters are set correctly, save them to the Matrix-1000™ reader by pressing the Send button. See Figure 42.

For successive configuration of other readers or for backup/archive copies, it is possible to save the configuration onto your PC by selecting the **Save Configuration File** option from the **File** menu.

From the **File** menu, you can also **Save Configuration As Text File** for a human readable version.

Load Configuration File (available in the **File** menu) allows you to configure a reader from a previously saved configuration file (.ini).

4.4.2 Calibration

VisiSet™ provides a Calibration Tool to maximize the reading performance by tuning the acquisition parameters and the time of the delayed triggers.

By selecting the Calibration Tool from the VisiSet™ Main Menu (***F***), the following window appears together with the Parameter Setup window:

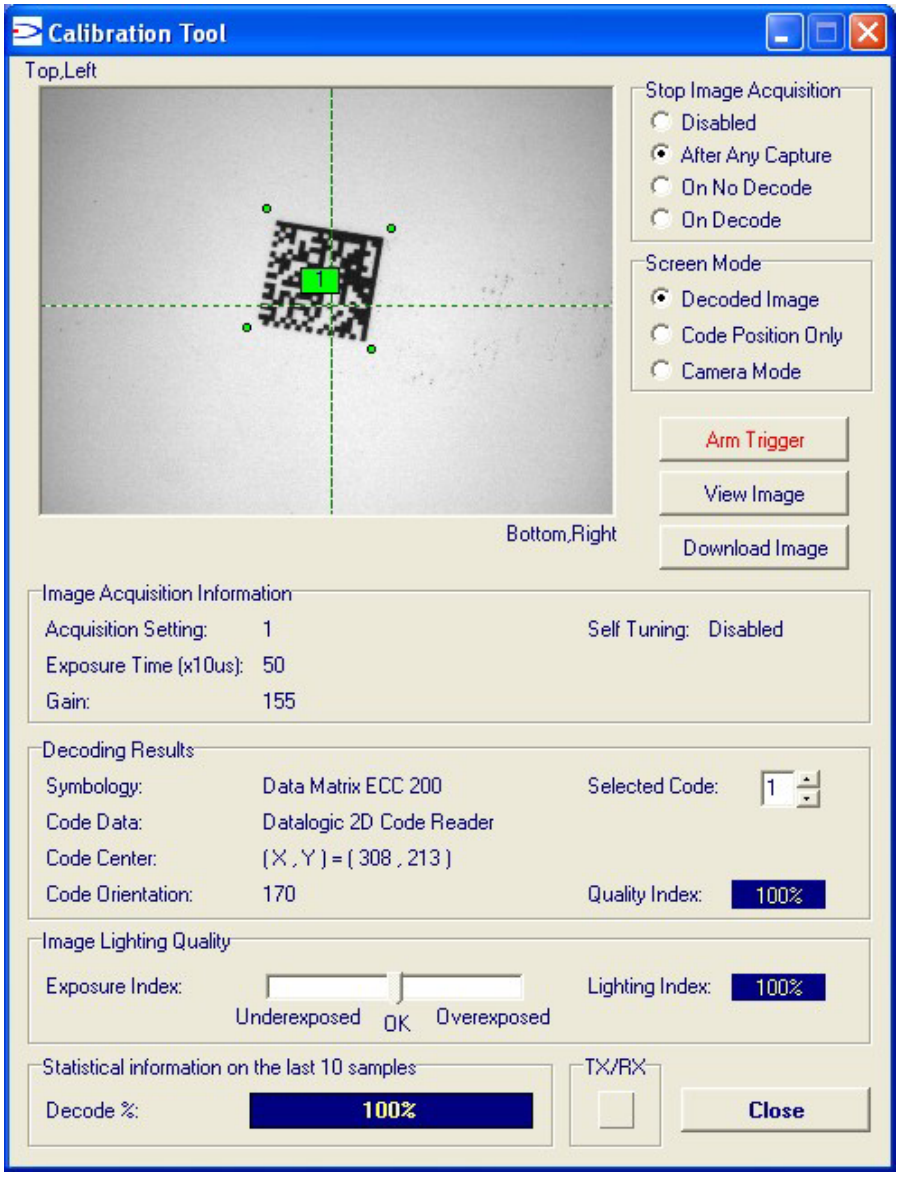


Figure 43 - Calibration OK

This tool provides a "real-time" image display while Matrix-1000™ is reading. It also gives immediate results on the performance of the installed Matrix-1000™ reader.

The Parameter Setup window works in Interactive Mode in order to cause each parameter setting to be immediately effective.

NOTE

If you want to save the temporary configuration to permanent memory, you must first close the Calibration Tool window. Then, you must disable the Interactive Mode and select the ***Permanent Memory*** *option from the* ***Send Configuration*** *item in the Device menu.*

The following examples show some of the typical conditions occurring during the installation:

Under Exposure:

To correct this result it is recommended to change the following parameters in their order of appearance:

1. increase the **Exposure Time (x 10 µs)**
2. increase the **Gain**

NOTE

In general, a longer exposure time corresponds to a lighter image but is susceptible to blurring due to code movement. Exposure time is also limited by the Internal Lighting mode parameter. ***Longer esposure times can be set if the power strobe level is lowered.***

High gain settings may produce a grainy image that may affect the decoding process.

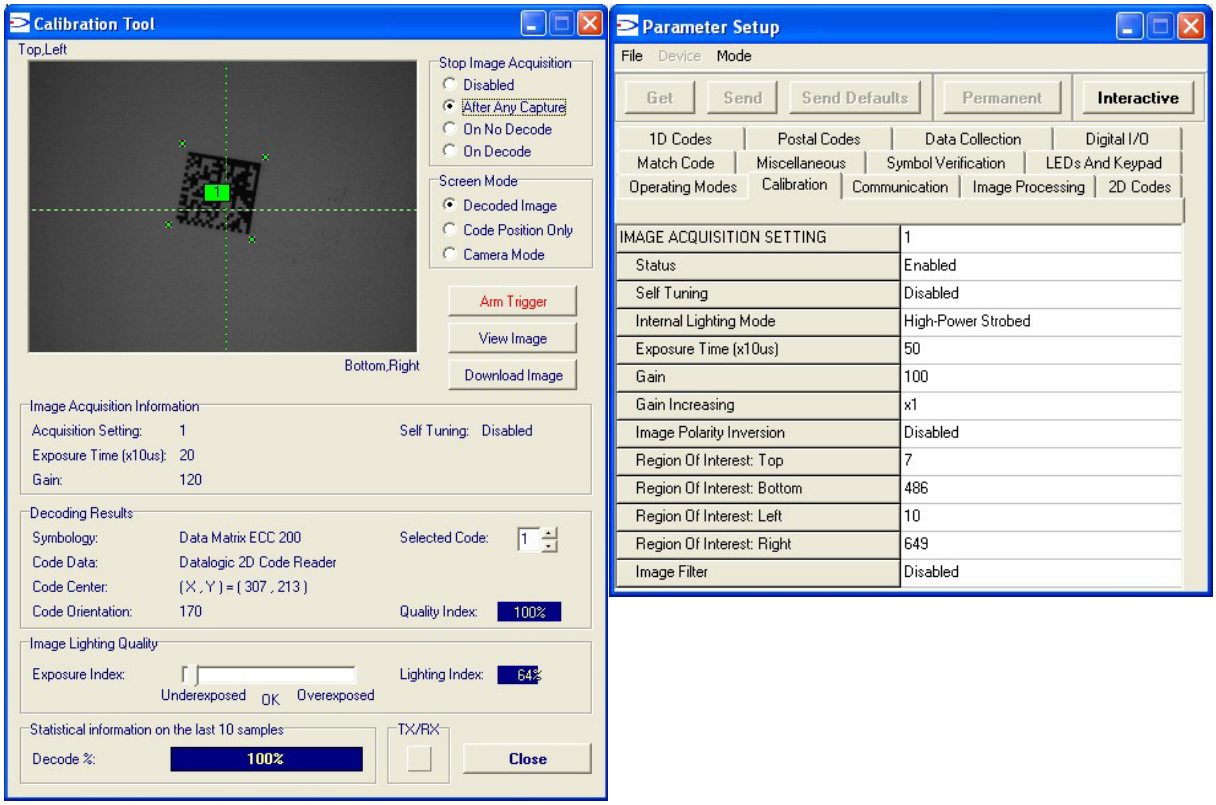


Figure 44 - Example Under Exposure: Too Dark

Over Exposure:

To correct this result it is recommended to change the following parameters in their order of appearance:

1. decrease the **Gain**
2. decrease the **Exposure Time (x 10 µs)**

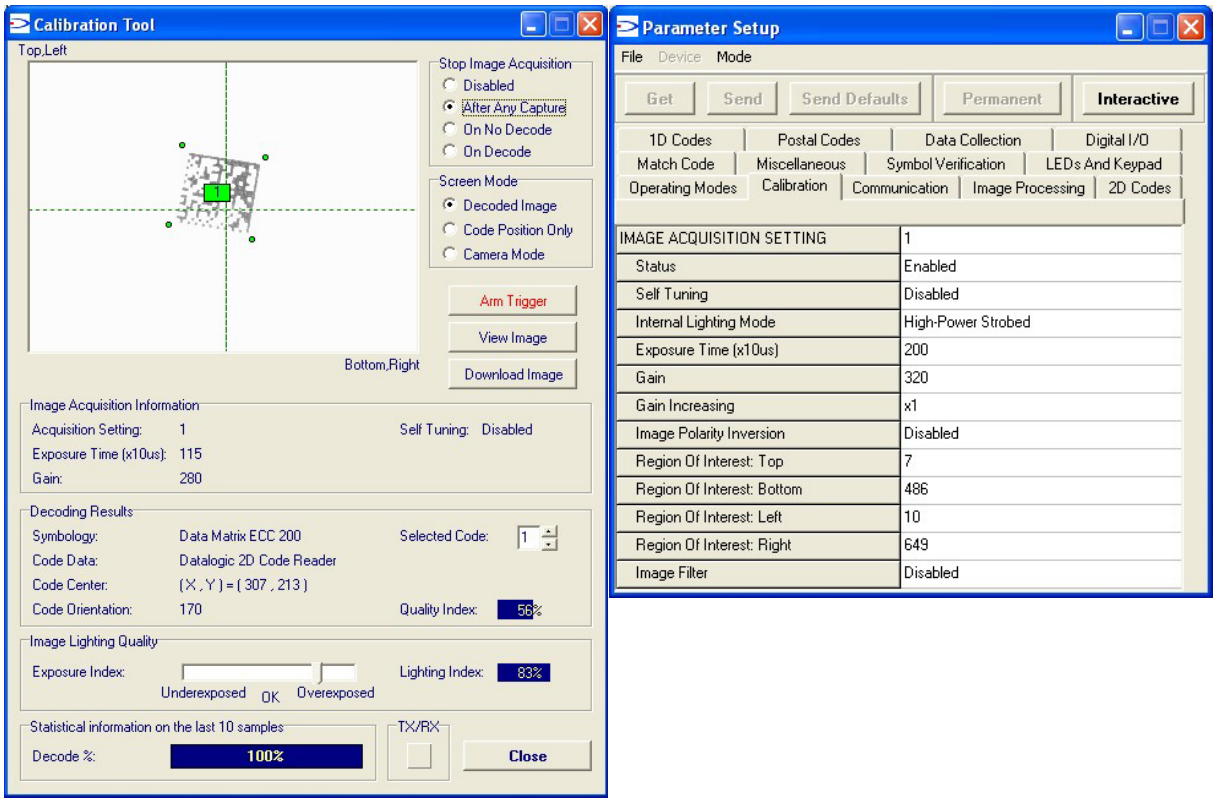


Figure 45 - Example Over Exposure: Too Light

Moving code out of the Field of View:

To correct this result and have the code completely visible in F.O.V., it is possible to follow one or both the procedures listed below:

- reposition the reader
- use the **Acquisition Trigger Delay** by tuning the **Delay Time (x100µs)**

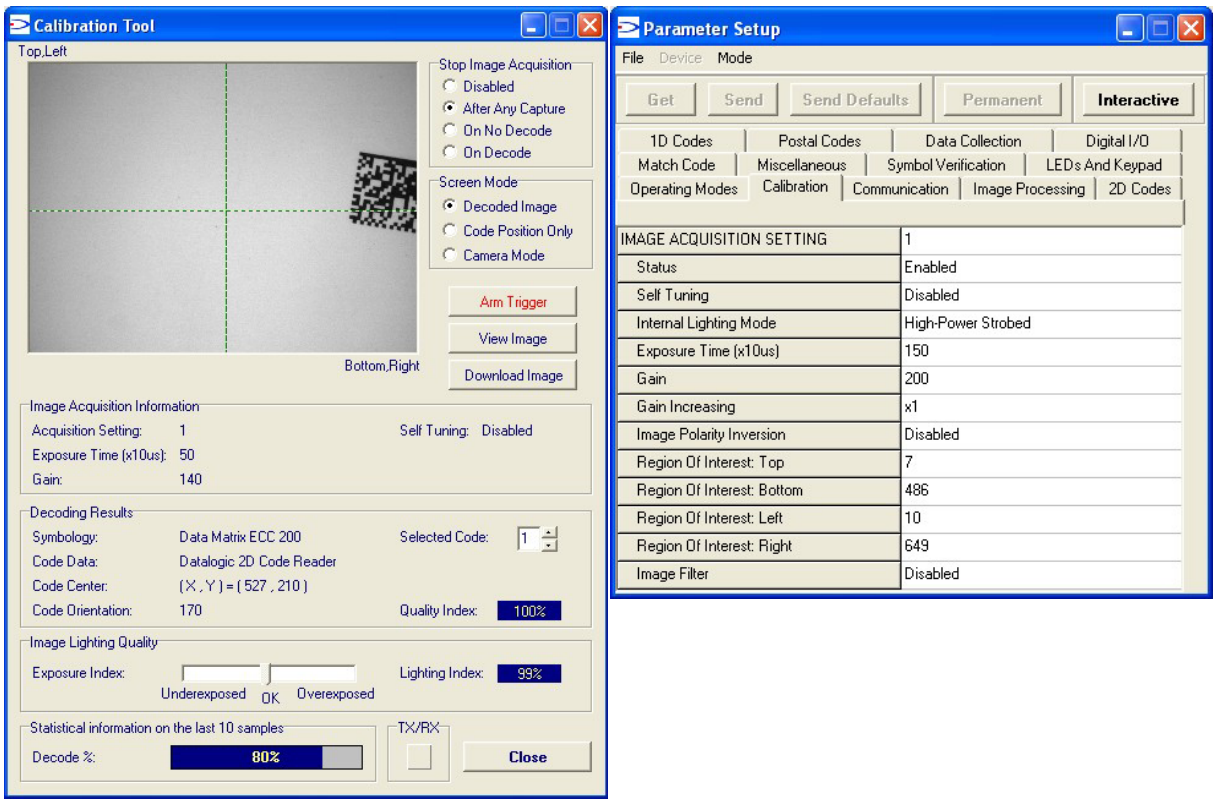


Figure 46 - Example out of FOV

4.5 IMAGE CAPTURE AND DECODING

By using the **Capture Image** and **Decode Last Image** functions from the VisiSet™ Main menu, you can get information about the image decodable codes in terms of Symbology, encoded Data, Position and Orientation, Decode Time and Code Quality Assessment Metrics.

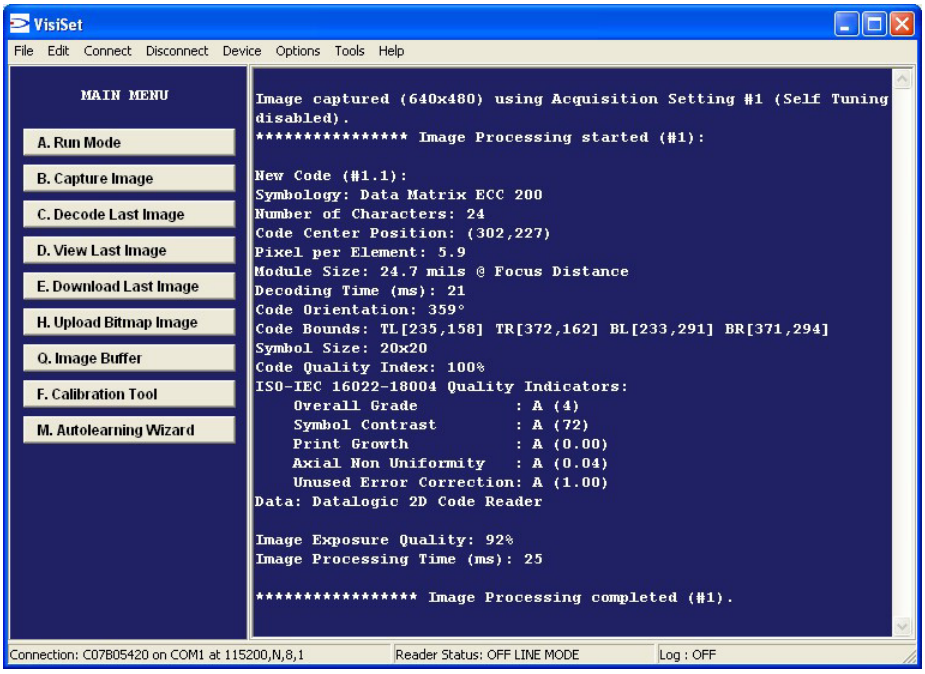


Figure 47 - Capture and Decoding Functions

4.6 STATISTICS

Statistics on the reading performance can be viewed by enabling the Statistics parameter and selecting the **View Statistics** item in the **File** menu. One of three different windows appears depending on the operating mode.
Refer to the VisiSet™ Help On Line for more details.

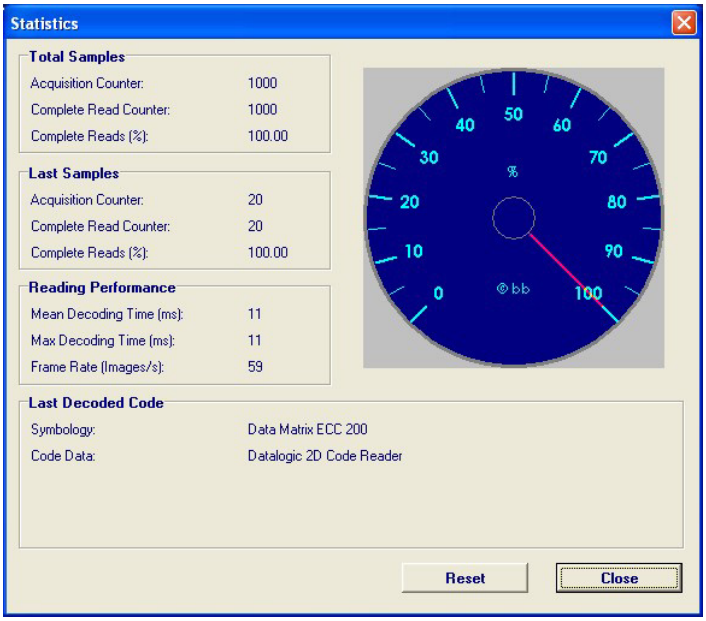


Figure 48 - Code Statistics

5 MAINTENANCE

5.1 CLEANING

Clean the reading window (see Figure A, 1) periodically for continued correct operation of the reader.

Dust, dirt, etc. on the window may alter the reading performance.

Repeat the operation frequently in particularly dirty environments.

Use soft material and alcohol to clean the window and avoid any abrasive substances.

6 TROUBLESHOOTING

6.1 GENERAL GUIDELINES

- When wiring the device, pay careful attention to the pin number of the signals and whether you are referring to the 25-pin connector or to the C-BOX 100 spring clamp connectors.
- If you need information about a certain reader parameter you can refer to the VisiSet™ program help files. Either connect the device and select the parameter you're interested in by pressing the F1 key, or select **Help>Parameters Help** from the command menu.
- If you're unable to fix the problem and you're going to contact your local Datalogic office or Datalogic Partner or ARC, we suggest providing (if possible): Application Program version, Parameter Configuration file, Serial Number and Order Number of your reader. You can get this information while VisiSet™ is connected to the reader: the Application Program version is shown in the Terminal Window; the Parameter Configuration can be saved to an .ini file applying the **File>Save Configuration File** command in the Parameter Setup window; Serial Number and Order Number can be obtained by applying the respective command in the **Tools** menu.

TROUBLESHOOTING GUIDE	
Problem	**Suggestion**
Power ON: the "PWR" LED is not lit.	• Is power connected? • If using a power adapter (like PG6000), is it connected to wall outlet? • If using rail power, does rail have power? • If using C-BOX 100, does it have power (check switch and LED)? • Check if you are referring to the 25-pin connector or to the C-BOX 100 spring clamp connectors. • Measure Voltage either at pin 13 and pin 25 (for 25-pin connector) or at spring clamp 1 and 2 (for C-BOX 100).
After Power ON: the "READ" LED is lit or blinking without any code in front of the reader and the connection to VisiSet™ fails.	• Contact your local Datalogic Automation office or Datalogic Automation Partner or ARC. See also http://www.automation.datalogic.com/ under Partners.
One Shot or Phase Mode: no image is displayed in Visiset™ Calibration Tool window while your trigger source is working.	• In the Operating Mode folder check the settings of ***Reading Phase-ON, Acquisition Trigger*** and ***Reading Phase-OFF*** parameters. • In Digital I/O folder set the echo of Phase or Acquisition Trigger on a reader output (if it is available) and in Run Mode check if the reader correctly receives your trigger and repeats it on the output. If this doesn't happen, check the Trigger source cabling. • In the Digital I/O folder check the EXTERNAL TRIGGER***Debounce Filter*** parameter setting. • Is the Phase frequency lower than the maximum frame rate?

TROUBLESHOOTING GUIDE	
Problem	**Suggestion**
One Shot or Phase Mode using the External Trigger input: the ”TRIG” LED is not blinking while the External Trigger is switching.	• Check if you are referring to the 25-pin connector or to the C-BOX 100 spring clamp connectors. • Is the sensor connected to the EXT TRIG input? • Is power supplied to the photo sensor? • For NPN configuration, is power supplied to one of the two EXT TRIG signals (A or B)? • For PNP configuration, is one of the two EXT TRIG signals grounded (A or B)? • Are the photo sensor LEDS (if any) working correctly? • Is the sensor/reflector system aligned (if present)?
One Shot mode using the External Trigger input: the ”TRIG" LED is correctly blinking but no image is displayed in VisiSet™ Calibration Tool window.	• In the Operating Mode folder check the ***Acquisition Trigger*** parameter setting. • In the Digital I/O folder check the EXTERNAL TRIGGER***Debounce Filter*** parameter setting.
Phase Mode using the External Trigger input: the ”TRIG" LED is correctly blinking but no image is displayed in VisiSet™ Calibration Tool window.	• In the Operating Mode folder check the settings of ***Reading Phase-ON, Acquisition Trigger*** and ***Reading Phase-OFF*** parameters. • In the Digital I/O folder check the EXTERNAL TRIGGER***Debounce Filter*** parameter setting. • Is the Phase frequency lower than the maximum frame rate?
One Shot or Phase Mode using serial trigger source: no image is displayed in Visiset™ Calibration Tool window while your trigger source is transmitted on the reader serial port.	• In the Operating Mode folder check the settings for ***Reading Phase-ON, Acquisition Trigger*** and ***Reading Phase-OFF*** parameters. • Are the COM port parameters (***Baud Rate***, ***Parity***, ***Data Bits***, ***Stop Bits***, ***Handshake***) correctly assigned? • In the communication folder, check the settings of ***Reading Phase-ON String, Acquisition Trigger String*** and ***Reading Phase-OFF String*** parameters. • Is the serial trigger source correctly connected?
Phase Mode: no result is transmitted by the reader at the end of the phase collection.	• In the Operating Mode folder check the ***Reading Phase-OFF*** parameter setting. • In the Data Collection folder check the settings for the CODE COLLECTION, DATA FORMAT and STATISTICS parameter groups.

TROUBLESHOOTING GUIDE	
Problem	**Suggestion**
Reading: the reader always transmits the ***No-Read Message***	• Run the Auto Learn procedure (**Auto Learn** in chapter 1). • Position the reader as described in par. **3.5** and through the VisiSet™ Calibration Tool: – Tune the ACQUISITION TRIGGER DELAY, if the moving code is out of the reader field of view; – Set the Continuous Operating Mode if no external trigger source is available; – Tune the IMAGE ACQUISITION SETTING to improve the code image quality; – Check the parameter setting in Decoding, 2D Codes, 1D Codes, and Postal Codes folders; – View the full resolution code image to check the printing or marking quality.
Communication: reader is not transmitting anything to the host.	• Is the serial cable wiring correct? • Are the host serial port settings the same as the reader serial port settings?
Communication: data transferred to the host are incorrect, corrupted or incomplete.	• Are the host serial port settings the same as the reader serial port settings? • In VisiSet™ Communication folder check the settings of Header and Terminator String parameters. • In VisiSet™ Data Collection folder, check the settings of DATA FORMAT parameter group.
How do I obtain my reader Serial Number?	• The reader Serial Number consists of 9 characters: one letter, 2 numbers, another letter followed by 5 numbers. • The reader Serial Number is printed on a label that is affixed on the bottom case near the reading window. • The Serial Number can also be obtained by selecting Tools/Get Reader Serial Number from the command menu in VisiSet™. A dedicated window will appear.
How do I obtain my reader Order Number?	• The reader Order Number consists of 9 numbers. • The reader Order Number can be obtained by selecting the Tools/Get Reader Order Number from the command menu in VisiSet™. A dedicated window will appear.

7 TECHNICAL FEATURES

ELECTRICAL FEATURES

Power	
Supply Voltage	10 to 30 Vdc
Power Consumption	4 W max.; 2.5 W typical
Communication Interfaces	
Main - RS485 half-duplex	2400 to 115200 bit/s
Auxiliary - RS232	2400 to 115200 bit/s
Input	
External Trigger	Opto-coupled and polarity insensitive
Max. Voltage	30 Vdc
Max. Input Current	10 mA
Output	
OUT3	Opto-coupled
V_{Out} (I_{Load} = 0 mA) Max.	30 Vdc
V_{Out} (I_{Load} = 10 mA) Max.	1.8 Vdc
$P_D = V_{Out} \times I_{Load}$ Max.	170 mW

OPTICAL FEATURES

Image Sensor	Matrix CCD
Image Format	VGA (640x480)
Lighting System	LED array
Wavelength	630 ~ 670 nm
Max LED Output Power	0.7 mW to EN60825-1
LED Safety Class	Class 1 to EN60825-1

USER INTERFACE

LED Indicators	PWR, TRIG, READ, COM, F1, F2
Keypad Button	Configurable via VisiSet™

SOFTWARE FEATURES

Readable Code Symbologies

1-D and stacked	2-D	POSTAL
• PDF417 Standard and Micro PDF417 • Code 128 (EAN 128) • Code 39 (Standard and Full ASCII) • Interleaved 2 of 5 • Codabar • Code 93 • Pharmacode • EAN-8/13 - UPC-A/E (including Addon 2 and Addon 5) • GS1 DataBar (RSS) Family • Composite Symbologies	• Data Matrix ECC 200 (Standard) • QR Code (Standard) • MAXICODE • Aztec Code • Microglyph (this symbology requires an activation procedure – contact you local Datalogic Automation distributor for details)	• Australia Post • Royal Mail 4 State Customer • Kix Code • Japan Post • PLANET • POSTNET, POSTNET (+BB) • POSTNET + PLANET, POSTNET (+BB) + PLANET

Operating Mode	ONE SHOT, CONTINUOUS, PHASE MODE
Configuration Mode	By means of VisiSet™ configuration software
Parameter Storage	Permanent memory (Flash)

SYMBOL VERIFICATION

Standard	Supported Symbologies
ISO/IEC 16022 ISO/IEC 18004	Data Matrix ECC 200 QR Code

MECHANICAL FEATURES

Dimensions	121 x 73 x 57 mm (4.76 x 2.87 x 2.24 in.)
Weight	330 g. (11.6 oz.)
Material	Magnesium alloy

ENVIRONMENTAL FEATURES

Operating Temperature	0 to 40 °C (32 to 104 °F)
Storage Temperature	-20 to 70 °C (-4 to 158 °F)
Max. Humidity	90% non condensing
Vibration Resistance IEC 68-2-6 test FC	14 mm @ 2 to 10 Hz; 1.5 mm @ 13 to 55 Hz 2 g @ 70 to 200 Hz; 2 hours on each axis
Shock Resistance IEC 68-2-27 test EA	30 g; 11 ms; 3 shocks on each axis
Protection Class	IP64 (sealed connectors required)

READING FEATURES							
Frame Rate	Up to 30 frames/sec. with VGA images						
Readable Codes per Frame	Up to 100						
Pitch	10° - 35°						
Tilt	0° - 360°						
MODELS	**Focus Distance mm (in)**	**Field of View [1] mm (in)**	**ppi [2]**	**Typ. Linear and Stacked Code Resolution mm (mils)**	**Typ. 2D Code Resolution mm (mils)**	**Reading Distance [3] mm (in)**	
						min.	**max.**
1021 HD	115 (4.53)	25 × 19 (0.98 × 0.75)	653	0.10 (4)	0.19 (7.5)	105 (4.13)	125 (4.92)
1031 SD	155 (6.10)	34 × 26 (1.34 × 1.02)	478	0.15 (6)	0.25 (10)	135 (5.31)	180 (7.08)
1041 LD	110 (4.33)	54 x 40 (2.13 × 1.57)	300	0.20 (8)	0.38 (15)	90 (3.45)	140 (5.51)
1051 MR	210 (8.26)	95 × 70 (3.74×2.75)	170	0.30 (12)	0.60 (24)	150 (5.90)	250 (9.84)

[1] @ Focus Distance

[2] Pixels per inch @ Focus Distance

[3] Measurement Conditions:

- Test Chart: provided with the reader
- Still code at the center of the FOV
- Code Symbology: DataMatrix ECC 200
- Code Resolution: Max. 2D Code Resolution
- Tilt Angle: 45°
- Skew Angle: 15°
- Image Processing Mode: Advanced Code Setting

Depending on the code resolution, symbology and number of characters in the code, the Reading Area can be different from the FOV.

GLOSSARY

Barcodes (1D Codes)
A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a barcode symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format.

BIOS
Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.

Bit
Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

Bits per Second (bps)
Number of bits transmitted or received per second.

Byte
On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory can be used to store one ASCII character.

Composite Symbologies
Consist of a linear component, which encodes the item's primary data, and an adjacent 2D composite component, which encodes supplementary data to the linear component.

Dark Field Illumination
Lighting of surfaces at low angles used to avoid direct reflection of the light in the reader's lens.

Decode
To recognize a barcode symbology *(e.g.,* Codabar, Code 128, Code 3 of 9, UPC/EAN, etc.) and analyze the content of the barcode scanned.

Depth of Field
The difference between the minimum and the maximum distance of the object in the field of view that appears to be in focus.

Diffused Illumination
Distributed soft lighting from a wide variety of angles used to eliminate shadows and direct reflection effects from highly reflective surfaces.

EEPROM
Electrically Erasable Programmable Read-Only Memory. An on-board non-volatile memory chip.

Element
The basic unit of data encoding in a 1D or 2D symbol. A single bar, space, cell, dot.

Flash
Non-volatile memory for storing application and configuration files.

Host
A computer that serves other terminals in a network, providing services such as network control, database access, special programs, supervisory programs, or programming languages.

Image Processing
Any form of information processing for which the input is an image and the output is for instance a set of features of the image.

Image Resolution
The number of rows and columns of pixels in an image. The total number of pixels of an image sensor.

Image Sensor
Device converting a visual image to an electric signal. It is usually an array of Charge Coupled Devices (CCD) or CMOS pixel sensors.

IEC
(International Electrotechnical Commission): Global organization that publishes international standards for electrical, electronic, and other technologies.

IP Address
The terminal's network address. Networks use IP addresses to determine where to send data that is being transmitted over a network. An IP address is a 32-bit number referred to as a series of 8-bit numbers in decimal dot notation *(e*.g., 130.24.34.03). The highest 8-bit number you can use is 254.

ISO
(International Organization for Standardization): A network of the national standards institutes of several countries producing world-wide industrial and commercial standards.

LED (Light Emitting Diode)
A low power electronic light source commonly used as an indicator light. It uses less power than an incandescent light bulb but more than a Liquid Crystal Display (LCD).

LED Illuminator
LED technology used as an extended lighting source in which extra optics added to the chip allow it to emit a complex radiated light pattern.

Matrix Symbologies (2D Codes)
An arrangement of regular polygon shaped cells where the center-to-center distance of adjacent elements is uniform. Matrix symbols may include recognition patterns which do not follow the same rules as the other elements within the symbol.

Multidrop
A communication protocol for connecting two or more readers in a network with a concentrator (or controller) and characterized by the use of individual device addresses.

Multi-row (or Stacked) Symbologies
Symbologies where a long symbol is broken into sections and stacked one upon another similar to sentences in a paragraph.

RAM
Random Access Memory. Data in RAM can be accessed in random order, and quickly written and read.

INDEX

DECLARATION OF CONFORMITY

CE 07

Datalogic Automation S.r.l.
Via S. Vitalino 13
40012 - Lippo di Calderara
Bologna - Italy

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declares that the
déclare que le
bescheinigt, daß das Gerät
declare que el

Matrix-1XXX; e tutti i suoi modelli
and all its models
et tous ses modèles
und seine Modelle
y todos sus modelos

sono conformi alle Direttive del Consiglio Europeo sottoelencate:
are in conformity with the requirements of the European Council Directives listed below:
sont conformes aux spécifications des Directives de l'Union Européenne ci-dessous:
der nachstehend angeführten Direktiven des Europäischen Rats:
cumple con los requisitos de las Directivas del Consejo Europeo, según la lista siguiente:

89/336/EEC EMC Directive e/and/et/und/y **92/31/EEC, 93/68/EEC** emendamenti successivi / further amendments / ses successifs amendements / späteren Abänderungen / succesivas enmiendas

Basate sulle legislazioni degli Stati membri in relazione alla compatibilità elettromagnetica ed alla sicurezza dei prodotti.
On the approximation of the laws of Member States relating to electromagnetic compatibility and product safety.
Basée sur la législation des Etats membres relative à la compatibilité électromagnétique et à la sécurité des produits.
Über die Annäherung der Gesetze der Mitgliedsstaaten in bezug auf elektromagnetische Verträglichkeit und Produktsicherheit entsprechen.
Basado en la aproximación de las leyes de los Países Miembros respecto a la compatibilidad electromagnética y las Medidas de seguridad relativas al producto.

Questa dichiarazione è basata sulla conformità dei prodotti alle norme seguenti:
This declaration is based upon compliance of the products to the following standards:
Cette déclaration repose sur la conformité des produits aux normes suivantes:
Diese Erklärung basiert darauf, daß das Produkt den folgenden Normen entspricht:
Esta declaración se basa en el cumplimiento de los productos con las siguientes normas:

EN 55022 (Class A ITE), August 1994:
Amendment A1 (Class A ITE), October 2000:
LIMITS AND METHODS OF MEASUREMENTS OF RADIO DISTURBANCE CHARACTERISTICS OF INFORMATION TECHNOLOGY EQUIPMENT

EN 61000-6-2, October 2001:
ELECTROMAGNETIC COMPATIBILITY (EMC)
PART 6-2: GENERIC STANDARDS - IMMUNITY FOR INDUSTRIAL ENVIRONMENTS

Lippo di Calderara, April 2nd, 2007

Lorenzo Girotti
Product & Process Quality Manager